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PATENT

Attorney Docket No.: BEA9-2000-0016-US1

**BOARD OF PATENT APPEALS
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of: Pai

SERIAL NO.: 09/752,909

FILING DATE: December 28, 2000

FOR: Volume Data Net Backup

Group Art Unit: 2186

Examiner: Thai, T.V.

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Technology Center 2100


TRANSMITTAL LETTER

Mail Stop: Appeal Brief - Patent
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Enclosed is a Brief in Support of Appeal in triplicate with copies of all references which were relied upon by Appellant, in triplicate, and a Credit Card Payment Form in the amount of \$330.00 pursuant to 37 C.F.R. §1.17(c).

Respectfully submitted,

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Date: January 12, 2004

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BRIEF OF PATENT OWNER ON APPEAL

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1. Real Party in Interest

International Business Machines Corporation, a New York corporation, is the real party in interest.

2. Related Appeals and Interferences

There are no related appeals or interferences.

3. Status of Claims

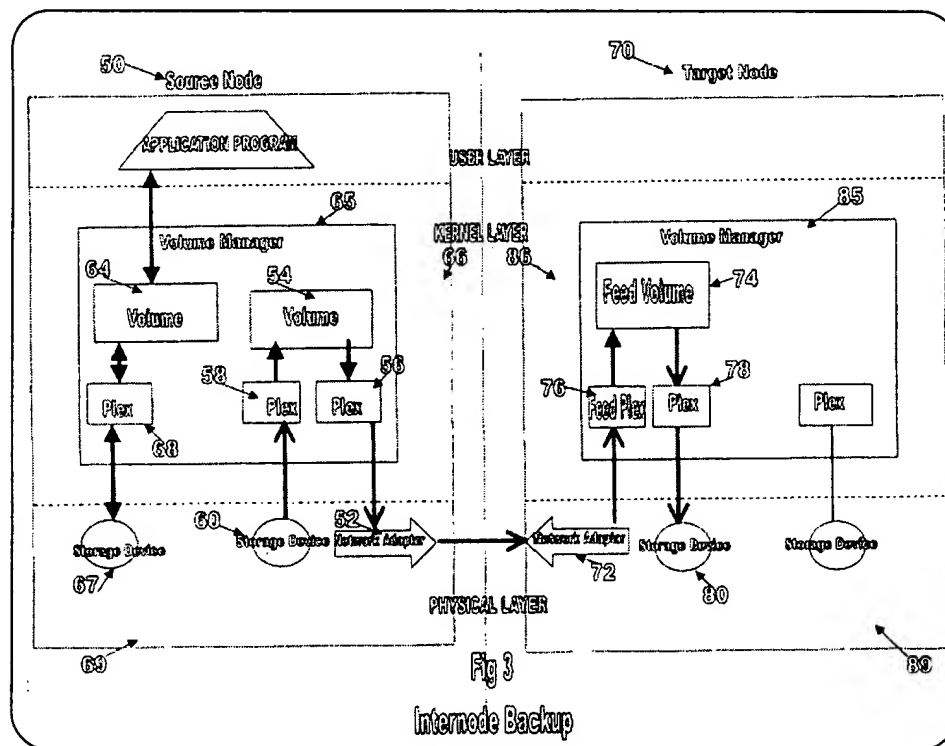
Claims 1-18 remain pending in the application. Claims 1, 9, and 15 were amended in response to the First Office Action dated April 1, 2003. The claims on Appeal are included in the Appendix.

4. Status of Amendments

There are no amendments to the claims after final rejection.

5. Summary of the Invention

With reference to Fig. 3, reproduced here below, Applicant's invention is a computer system incorporating the use of a plex for mapping data from a storage device.



In this illustration, there is a source node (50) which contains the data, and a target node (70) adapted to receive data from the source node for backup. The source node (50) has a volume manager (65) present in the kernel layer of the operating system, and a network adapter (52) present in the physical layer of the operating system. The volume manager of the source node includes a plurality of plexes configured to receive data from the storage device(s) in the

physical layer of the source node, and to send the received data to the network adapter (52). Similarly, the volume manager of the target node has a plurality of plexes configured to receive data from the network adapter (72), and to transfer the received data to the feed volume (74) of the target node. The feed volume directs the received data from the source node to all other plexes in that volume, of which one of the plexes is in communication with a storage device of the physical layer. Both the volume and the plexes in both the source node and the target node are grouped in the kernel layer of the operating system. This grouping allows data to be directly communicated between nodes at the kernel layer of the operating system. It is the grouping of the plexes and volumes that remove the requirement to copy data through the user layers of the operating system during a backup operating across a network. Accordingly, the placement of the plexes in combination with the placement and communication with the associated volume provides a data transfer tool to enable data to be communicated between nodes at the kernel layer of the operating system.

6. Issues

Claims 1-18 are rejected as being unpatentable over *Ashcroft et al.* under 35 U.S.C. §103(a).

7. Grouping of Claims

There are two groupings of claims. Applicant has separated the pending claims into two different groups as the claims in the different groups do not stand or fall together, and hereby requests separate consideration of the claims in each of the separate groups.

Group I: Claims 1-6, 8-12, and 14-18 are rejected on the *Ashcroft et al.* patent. The Examiner asserts that all of the elements of these claims are obvious under 35 U.S.C. §103(a).

Group II: Claim 7 and 13 are rejected on is rejected on the *Ashcroft et al.* patent.

The Examiner asserts that all of the elements of these claims are obvious under 35 U.S.C. §103(a).

ARGUMENT

I. Group I: Rejection of Claims 1-6, 8-12, and 14-18 under 35 U.S.C. §103(a).

In the Official Action of August 12, 2003, the Examiner rejected claims 1-6, 8-12, and 14-18 under 35 U.S.C. §103(a) as being unpatentable over *Ashcroft et al.*, U.S. Patent No. 6,460,144. The U.S. Supreme Court set forth the factual inquiries in determining obviousness under 35 U.S.C. §103(a) as follows:

1. Determining the scope and contents of the prior art;
2. Ascertaining the differences between the prior art and the claims at issue;
3. Resolving the level of ordinary skill in the pertinent art; and
4. Considering objective evidence present in the application indicating obviousness or non-obviousness in view of the first three factors.

Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966).¹ In following this factual inquiry, the Examiner must first consider the scope and contents of the prior art.

A. Discussion of the Contents of the Prior Art Reference Cited by the Examiner.

In rejecting claims 1-6, 8-12, and 14-18 under 35 U.S.C. §103(a) as being unpatentable over *Ashcroft et al.*, the Examiner is hypothetically applying a multi-computer system with a disk array and plexes within the disk array in an attempt to reconstruct Applicant's invention.

The *Ashcroft et al.* reference shows a computer system with multiple server nodes

¹ Applicant wishes to note that the U.S. Supreme Court in *Graham v. John Deere Co.* set forth a three part factual inquiry under 35 U.S.C. §103. Examiner's noted fourth part is merely recognized as the analysis of the results of the first three parts of the inquiry noted here.

physically connected to a disk array (see Col. 2, lines 14-15), a system administration workstation, an archive server, and a magnetic tape drive. See Fig. 1 (reproduced below).

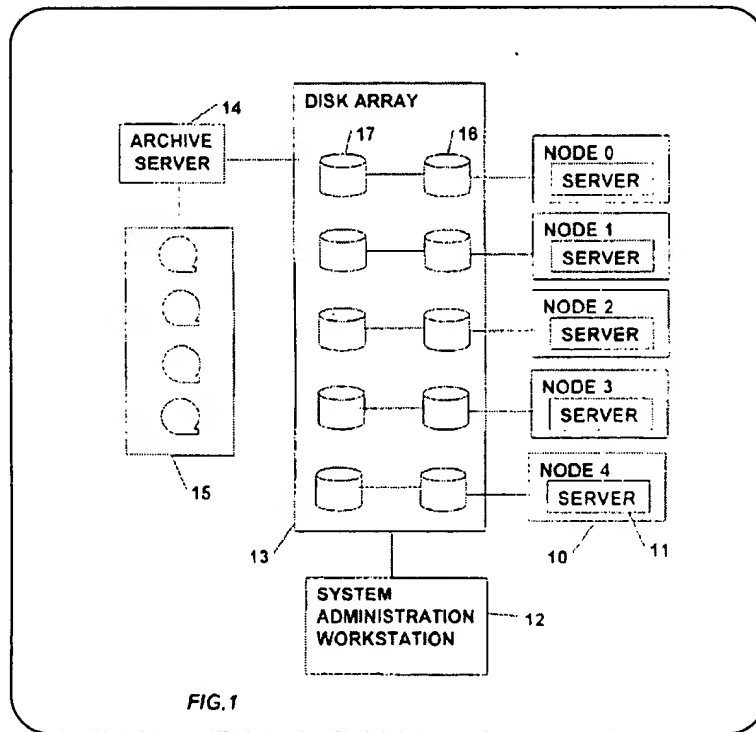


Figure 2 (Fig. 1 of *Ashcroft et al.*, U.S. Patent No. 6,460,144)

The archive server is physically connected to the disk array, see Col. 2, lines 30-31, and is physically connected to the magnetic tape drives (15), see Col. 2, lines 31-32. The disk array “consists of a large number of magnetic disk units, all of which are mirrored (duplexed) for resilience.” Col. 2, lines 16-17. The data storage system of *Ashcroft et al.* discloses multiple system disks and BCV disks all of which may be mirrored within the data storage (13). The archive server “periodically performs an offline archive of the data in each database, by archiving the copy of the database held in the BCV to tape.” Col. 2, lines 32-34. The archive server functions in tandem with disk (17), which is a disk holding a backup of an associated system disk (16). Accordingly, the computer system of *Ashcroft et al.* provides a disk array with a system disk and a backup disk for each server, as well as an archive server adapted to conduct an offline archive of the data in the backup disk.

B. Differences between the prior art and the claims at issue

In reviewing and studying the prior art reference of *Ashcroft et al.*, it is clear that although *Ashcroft et al.* may contain some of the elements of Applicant's invention, the scope of the contents are divergent in nature. The *Ashcroft et al.* patent accounts for a computer system that enables an archive server to store data on a magnetic tape drive from a disk housing a backup copy of data from a system disk. There is no consideration given for direct communication from a source node to a target node. The direct communication, as claimed by Applicant, implies on-line archiving of data because the logical volume must be active for direct communications to occur. Therefore, there cannot be direct communication unless the communication is on-line. However, the backup of data of *Ashcroft et al.* is clearly an "offline" procedure. See Col. 2, line 33. Accordingly, Applicant's invention and *Ashcroft et al.* clearly diverge with respect to the on-line and offline aspects of the communication between nodes.

Furthermore, in order for *Ashcroft et al.* to provide direct communication between the source node and target node, the target node would have to be aware of the system disk of the source node in order to identify the source node and communicate with it. The system disk of *Ashcroft et al.* communicates with the server node. However, there is no communication between a specified server node and the archive server, or with any of the other server nodes in the system. When a backup of the system disk occurs in *Ashcroft et al.*, it is the backup of the system disk that is in communication with the archive server that occurs, and not between the server nodes and the archive server. Although it is possible to interpret the server node as the source node and the archive server as the target node because of their relationship and since no other servers in *Ashcroft et al.* communicates with the archive server, it remains that there is no direct communication between any of the server nodes and the archive node. Since, the archive server archives the copy of the database held in the BCV disk 17 to tape, the only communication associated with the server node is with the system disk. See Col. 2, line 34. Similarly, the only communication associated with the archive server is with the BCV disk. Accordingly, *Ashcroft et al.* fails to provide any direct communications between server nodes and the archive server as provided by Applicant.

Furthermore, the shared disk array which houses the system disks and BCV disks contains mirrors therein. “The BCV data can be synchronized with the primary plexes so as to provide a backup, or can be disconnected from the primary plexes, so as to provide a snapshot of the main data at a given point in time.” Col. 2, lines 23-26. In this instance, there is also no direct communication between the system disk and/or server node and the archive server. In fact, there is only indirect communication between the system disk and/or server node and the archive server through the BCV disk, and this communication is through the physical layer of the operating system, not by way of the plex in the kernel layer of the operating system, as taught by Applicant. Accordingly, *Ashcroft et al.* fails to account for a computer system which enables direct communication between a source node and a target node at the kernel layer of the operating system.

C. Discussion of Applicant’s Invention in View of the Prior Art References and Prior Art References Failure to Teach All of the Claimed Limitations of Applicant’s Invention.

As the CAFC has made clear, the prior art must teach the desirability of the modification. “The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification.” *In re Gordon et al.*, 733 F.2d 900, 221 USPQ 1125, 1127 (Fed. Cir. 1984). It is axiomatic that the subject matter of the claims may not be considered obvious as a result of a hypothetical combination of references unless something in the references suggests that an advantage may be derived from combining their teachings. In this respect, the CAFC appears to speak directly to the issue of the need to determine the scope and contents of the prior art. Accordingly, the determination as to what may be within the scope and contents of the prior art serves to establish the parameters of what art may even be considered in determining the obviousness of an invention.

As noted above, the patent of *Ashcroft et al.* uses plexes within the disk array to produce a backup copy of the system disk. However, this is where the similarities between Applicant and *Ashcroft et al.* end. In order to apply *Ashcroft et al.* to Applicant’s pending application, *Ashcroft et al.* must be modified and reconfigured in order to support direct communication between the

server node and archive server of *Ashcroft et al.*, as claimed by Applicant. *Ashcroft et al.* provides direct communication between the server node and the system disk, and between the backup disk and the archive server. The only communication that can be implied between the server node and archive server of *Ashcroft et al.*, is clearly a form of indirect communication. In order to provide direct communication between the server node and archive server, the system of *Ashcroft et al.* must be modified in such a way as to provide that the archive server is aware of the system disk. However, this goes against the teaching of *Ashcroft et al.* “Although a prior art device “may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so.” MPEP §2143.01 (citing *In re Mills*, 916 F.2d 680, 682, 16 USPQ 2d. 1430 (Fed. Cir. 1990)). *Ashcroft et al.* does not suggest direct communication between one of the server nodes and any other node in the system, whether it be another server node or the archive server. To read *Ashcroft et al.* as providing direct communication between a source node and a target node would require a modification to the invention of *Ashcroft et al.* not envisioned or required in the system of *Ashcroft et al.* The only suggestion for utilizing a system with direct communication between the source node and target node is derived from Applicant’s invention. Absent Applicant’s invention, there is no suggestion or motivation within *Ashcroft et al.* for such a modification. “It is impermissible to use the claimed invention as an instructions manual or ‘template’ to piece together the teachings of the prior art so that the claimed invention is rendered obvious.” *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ 2d 1780 (Fed. Cir. 1992) (citing *In re Gorman*, 933 F.2d 982, 987 (Fed. Cir. 1991)). Yet this is the very process that the Examiner has attempted to undertake. Although Applicant’s invention may appear to combine elements found in *Ashcroft et al.*, “the inquiry under [35 U.S.C.] §103 is whether prior use makes the picture of the jigsaw puzzle, rather than its pieces obvious.” *Kori Corp. v. Wilco Marsh Buggies & Draglines*, 708 F.2d 151, 155 (5th Cir. 1983). The entirety of Applicant’s invention is greater than the sum of the parts that comprise the novelty of the invention. “[T]he linchpin is not whether the individual components of the patent were obvious at the time of the invention, but whether the aggregation produced a new or different result or achieved a synergistic effect.” *Id.* (citing *Continental Oil co. v. Cole*, 634 F.2d 188, 197 (5th Cir. 1981)). Unlike *Ashcroft et al.*, Applicant’s invention uses a plurality of plexes to provide a novel system for storing data from a network on a node. Accordingly,

Applicant respectfully contends that the teachings of *Ashcroft et al.* does not meet the standard set by the CAFC's interpretation of 35 U.S.C. §103(a), and respectfully requests the Board of Patent Appeals rule in Applicant's favor and direct allowance of claims 1-6, 8-12, and 14-18.

Furthermore, the Examiner clearly states that "Ashcroft clearly discloses that many modifications could be made to the system without depart from the scope of the invention, particularly Ashcroft clearly discloses that his invention can be implemented in other operating system which including the amended portion of the claims wherein the data is directly communicated from a kernel layer of a source node to a kernel layer of a target node." Second Official Action, page 3, lines 10-16. As should be obvious from the language of *Ashcroft et al.*, the invention of *Ashcroft et al.* can be applied to different operating systems. However, the application of *Ashcroft et al.* to different operating systems does not justify an alteration to the very nature of the invention so that it may be applied to different layers within various operating systems in a manner inconsistent with the specification and claims of *Ashcroft et al.* *Ashcroft et al.* states that the modification are within the quantity of disks and computers, use of other operating systems, and use of other hardware configurations. See Col. 4, lines 28-31. The Examiner's statement that the *Ashcroft et al.* invention's implementation in other operating systems includes the ability to alter the invention from its intended application within an operating system to application on different layers of the operating system reaches beyond the spirit and scope of *Ashcroft et al.* as it alters the very structure, use, and application of the invention – i.e. it creates a new invention. In reading Applicant's claims in conjunction with the specification, Applicant clearly discloses the known existence of the three layers of the operating system of a computer system – User Layer, Kernel Layer, and Physical Layer. The User Layer houses the application program, the Kernel Layer houses the Volume Manager with plexes therein, and the Physical Layer houses the storage devices and network adapter. Applicant's claims clearly state that the structure of the program stack enables data to be directly communicated across the kernel layer of the computer system without reference to the specific type of operating system. Applicant's claims omit any reference to the specific operating system as, unlike *Ashcroft et al.*, the operating system does not limit Applicant's invention since Applicant's invention is applied to the kernel layer of an operating system as opposed to the user

layer or physical layer. Although *Ashcroft et al.* provides the well known boilerplate spirit and scope clause that modifications may be made to their disclosure, these modifications remain limited to the scope of the associated specification. It is improper for the Examiner to attempt to substitute “fair teaching or suggestion” requirements needed to support a rejection on obviousness grounds with a conventional “spirit and scope clause” in an issued patent, especially when the Examiner attempts to apply the specific wording of the clause beyond the scope of the issued patent. Accordingly, since Applicant is not claiming a specific operating system or functionality within the operating system and the “modifications” the Examiner is reading into *Ashcroft et al.* would require altering the very structure, use, and application of the invention, the *Ashcroft et al.* language still fails to read on Applicant’s invention.

In addition, the modifications that are suggested by *Ashcroft et al.* still fail to suggest that such modifications would enable direct communication from a source node to a target node, as claimed by Applicant. *Ashcroft et al.* provides that the only form of direct communication is from a server node to the system disk, and from the BCV of the system disk to the archive server. Both the system disk and the BCV are not computer nodes, they are physical storage media. There is no direct communication between any of the nodes of *Ashcroft et al.* It is accepted that “[t]o establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.” MPEP §2143.03 (citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)). Even in view of the Examiner’s expansion of the “modifications” statement of *Ashcroft et al.* beyond the scope of its specification and claims, there still remains no teaching, suggestion, or motivation in *Ashcroft et al.* for direct communication of data between nodes. *Ashcroft et al.* does not teach or suggest that the direct communication between nodes occur at the kernel layer of the operating system, as is suggested by the Examiner. Even with application of *Ashcroft*’s language in Col. 4, lines 26-34, *Ashcroft et al.* continues to neglect any teaching towards direct communication, as well as an efficient use of the layers of the program stack. However, Applicant’s claimed invention requires the placement of the plexes within the kernel layer of the operating system of both the source node and the target node. It is the location of the plexes that enables the direct communication of data between the nodes. The elements that *Ashcroft et al.* fails to address are critical to the

advantages found in Applicant's invention. *Ashcroft et al.* fails to teach all of the claim limitations and fails to establish the prima facie obviousness of the claimed invention, anywhere in the specification and associated drawing figures. Accordingly, the Applicant respectfully submits that claims 1-6, 8-12, and 14-18 would not have been obvious in view of *Ashcroft et al.* ('144) and a ruling by the Board of Patent Appeals in Applicant's favor and allowance of claims 1-6, 8-12, and 14-18 is respectfully requested.

As the CAFC has made clear, the prior art must teach the desirability of the modification in question. "The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification." *In re Gordon et al.*, 733 F.2d 900, 221 USPQ 1125, 1127 (Fed. Cir. 1984). It is axiomatic that the subject matter of the claims may not be considered obvious as a result of a hypothetical modification of a reference unless something in the reference suggests that an advantage may be derived from the modification. In this respect, the CAFC appears to speak directly to the issue of the need to determine the scope and contents of the prior art. "When obviousness is based on a single prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference." *B.F. Goodrich Co. v. Aircraft Breaking Systems Corporation*, 72 F.3d 1577, 1582, 37 USPQ2d 1314, 1318 (Fed. Cir. 1996). Although *Ashcroft et al.* relates to a computer system with a disk array and a plurality of plexes housed with the disk array, there is no suggestion or motivation to provide any structure to enable the direct communication between a source node and a target node, as is suggested by the Examiner. The desirability of the modification can be found at best only through the use of Applicant's invention. Therefore, the prior art reference does not render Applicant's invention obvious as there is no teaching, suggestion, or motivation to apply elements found in *Ashcroft et al.* having different purposes to build the product of Applicant. Accordingly, Applicant respectfully contends that the *Ashcroft et al.* does not meet the standard set by the CAFC's interpretation of 35 U.S.C. §103(a), and respectfully requests the Board of Patent Appeals rule in Applicant's favor and direct allowance of claims 1-6, 8-12, and 14-18.

II. Group II: Rejection of Claims 7 and 13 under 35 U.S.C. §103(a).

The Official Action of August 12, 2003 rejected claims 7 and 13 under 35 U.S.C. §103(a) as allegedly being unpatentably obvious over *Ashcroft et al.*, U.S. Patent No. 6,460,144. The Examiner maintains that it would have been obvious to modify the prior art reference that served the basis for the rejection. Accordingly, the Examiner appears to maintain that it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the cited prior art reference to construct the Applicant's claimed invention.

In rejecting claims 7 and 13 under 35 U.S.C. §103(a) as being unpatentable *Ashcroft et al.*, the Examiner is hypothetically modifying the prior art reference to allegedly construct the Applicant's claimed invention. The U.S. Supreme Court set forth the factual inquiries in determining obviousness under 35 U.S.C. §103(a) as:

- A. Determining the scope and contents of the prior art;
- B. Ascertaining the differences between the prior art and the claims at issue;
- C. Resolving the level of ordinary skill in the pertinent art; and
- D. Considering objective evidence present in the application indicating obviousness or non-obviousness in view of the first three factors.

Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966).² In following this factual inquiry, the Examiner must first consider the scope and contents of the prior art.

- A. Discussion of the Contents of the Prior Art References Cited by the Examiner.

The above discussion of *Ashcroft et al.* is hereby incorporated by reference.

- B. Differences between the prior art and the claims at issue

In reviewing and studying the prior art reference of *Ashcroft et al.*, it is clear that

² See, supra, footnote 1.

although *Ashcroft et al.* may contain some of the elements of Applicant's invention, the scope of the contents are divergent in nature. The *Ashcroft et al.* patent accounts for a computer system which enables an archive server to store data on a magnetic tape drive from a disk housing a backup copy of data from a system disk. The archive server of *Ashcroft et al.* maintains some form of physical connection to the disk array 13 and to a robotic magnetic tape drive. See Col. 2, lines 30-32. The archive server periodically performs an archive of data "by archiving the copy of the database held in the BCV to tape." Col. 2, lines 33-34. There is no teaching in *Ashcroft et al.* for the archive server to contain a plex or to function as a plex, as suggested by the Examiner. In fact, *Ashcroft et al.* is clear that the magnetic disks of the disk array 13 are mirrored, and the BCV functions as a third plex. See Col. 2, lines 16-20. There is no teaching or suggestion in *Ashcroft et al.* for a plex, or an equivalence thereto, residing outside the disk array structure. The plex of the source node, as claimed by Applicant, implies that the plex is directly related to the node and not to the disk array. The plexes of *Ashcroft et al.* clearly reside within an independent physical structure that resides within the computer system, and external to any of the nodes in the system. There is no teaching within *Ashcroft et al.* for a plex to reside within any of the server nodes or the archive server. Accordingly, Applicant's invention and *Ashcroft et al.* clearly diverge with respect to the physical placement and utilization of the plexes to enable efficient storage of data between nodes of a computer system.

C. Discussion of Applicant's Invention in View of the Prior Art References and Prior Art References Failure to Teach All of the Claimed Limitations of Applicant's Invention.

The discussion of *Ashcroft et al.* above is hereby incorporated by reference. As noted above, Applicant respectfully submits that the limitations of Applicant's claimed invention would not have been obvious for the reasons discussed in Section I above regarding *Ashcroft et al.* Accordingly, Applicant respectfully requests a ruling by the Board of Patent Appeals and Interferences in Applicant's favor and allowance of claim 7 and 13.

In reviewing and studying the prior art reference of *Ashcroft et al.*, it is clear that this reference does not touch on the structure of the nodes and plexes as taught by Applicant. The

Ashcroft et al. patent accounts for a plurality of plexes within the disk array, including a third plex within the BCV, also housed within the disk array. The plexes of Applicant are shown housed within the source node and target node as clearly depicted in Applicant's Fig 3. There is no suggestion for taking the computer system of Applicant and changing the structure to place the plexes in a storage device. Nor is there a suggestion in *Ashcroft et al.* to remove the plexes from the physical storage devices within the disk array and place them within one of the nodes in the system. "To establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art." MPEP §2143.03 (citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)). Clearly, the *Ashcroft et al.* patent does not teach the limitations of the placement of plexes external to the physical storage device(s) as suggested by the Examiner. *Ashcroft et al.* has a plurality of plexes within the physical storage devices of the disk array, wherein the disk array is external to the server nodes and the archive server. There is no teaching or suggestion in *Ashcroft et al.* to impart the plexes of the disk array into the source node. Accordingly, Applicant respectfully submits that claims 7 and 13 would not have been obvious for the above outlined reasons and a ruling by the Board of Patent Appeals and Interferences in Applicant's favor and allowance of claims 7 and 13 is respectfully requested.

D. Discussion of Applicant's Invention in View of the Prior Art References and Prior Art References Failure to Teach the Desirability of Applicant's Invention.

The discussion of *Ashcroft et al.* above are hereby incorporated by reference. As noted above, Applicant respectfully submit that the limitations of Applicant's claimed invention would not have been obvious for the reasons discussed in Section I above regarding *Ashcroft et al.* and this Section II, subsections A-C regarding *Ashcroft et al.* Applicant contends that the prior discussion clearly mitigates in favor of concluding that the prior art reference utilized by the Examiner fail to teach the desirability of Applicant's invention. Accordingly, Applicant respectfully requests a ruling by the Board of Patent Appeals and Interferences in Applicant's favor and allowance of claims 7 and 13.

IV. Conclusion

In view of the rejections presented by the Examiner in the Office Action made final, it appears clear on the record that the *Ashcroft et al.* reference does not obviate Applicant's invention based upon the legal definition of obviousness. Although the prior art reference cited by the Examiner relates to a computer system having plexes therein, the plexes of *Ashcroft et al.* physically reside within a physical disk array housed separate from the server nodes and archive server. *Ashcroft et al.* does not exhibit the motivation or suggest the desirability of modifications present such that one skilled in the art would find it obvious to incorporate modifications to enable the communication between nodes as claimed by Applicant to efficient store data within the computer system. In fact, *Ashcroft et al.* neither mentions nor suggests direct communication between nodes or between nodes and the archive serve, nor does it teach or suggest placement of a plex within the node itself. Accordingly, as noted above, it is improper to use Applicant's claimed invention as a template for hindsight reconstruction or as the very means for drawing to the obviousness of the claimed invention even if that could construct the claimed invention where the prior art is otherwise not analogous nor suggests the desirability for one skilled in the art to incorporate such modifications.

Applicant believes that those skilled in the art have failed to solve the problem as claimed

by Applicant. Accordingly, for the reasons outlined above, Applicant respectfully requests the Board of Patent Appeals direct allowance of this application and all pending claims.

Respectfully submitted,

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Date: January 9, 2004

Appendix:

1. A method for efficiently storing data from a network on a node, comprising:
connecting a first plex to a network device;
connecting a second plex to a data storage device;
grouping the plexes into a logical volume;
receiving data from the network by the first plex; and
storing said data on said storage device by said second plex, wherein said data is
directly communicated from a kernel layer of a source node to a kernel layer of a target node.
2. The method of claim 1, further comprising configuring said node as a target node for
backing up data from said network.
3. The method of claim 2, wherein said first plex is a feed plex for receiving data from a
source node.
4. The method of claim 2, wherein said volume is a feed volume for writing data to said
plexes.
5. The method of claim 1, further comprising configuring said node as a source node for
restoring data received from a target node.
6. The method of claim 5, wherein said second plex of said target node is a feed plex for
communicating data from said storage device to said logical volume of said target node.
7. The method of claim 5, wherein said first plex of said source node is a feed plex for
receiving data from a target node.
8. The method of claim 5, wherein said volume of said source node is a feed volume for
writing data to said plexes.

9. A computer system, comprising:
a network device;
a data storage device;
a first plex connected to the network device;
a second plex connected to the data storage device; and
a volume connected to the first and second plexes adapted to directly communicate data from a kernel layer of a source node to a kernel layer of a target node.

10. The system of claim 9, wherein said first plex is a feed plex in a target node to manage backup of data to said volume.

11. The system of claim 10, wherein said volume is a feed volume.

12. The system of claim 9, wherein said second plex is a feed plex of a target node to manage transfer of data from said storage device to said volume.

13. The system of claim 12, wherein said first plex of a source node is a feed plex to manage restoration of data to said volume of said source node.

14. The system of claim 13, wherein said volume is a feed volume.

15. An article comprising:
a computer-readable signal-bearing medium;
means in the medium for connecting a network adapter of a networked computer system to a first plex;
means in the medium for connecting a data storage device of the system to a second plex;
means in the medium for connecting a volume to said first and second plexes; and
means in the medium for managing a direct transfer of data from a kernel layer of a source node to a kernel layer of a target node.

16. The article of claim 15, wherein the medium is selected from the group consisting of: a recordable data storage medium and a modulated carrier signal.
17. The article of claim 15, wherein said first plex is a feed plex of a target node and said managing means backs up data from a source node to said target node.
18. The article of claim 15, wherein said first plex is a feed plex of a source node and said managing means restores data from a target node to said source node.

Brief of Patent Owner on Appeal

REFERENCES & CITED CASES

(In re Pai., Serial No.: 09/752,909)



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(12) **United States Patent**
Ashcroft et al.

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(54) **RESILIENCE IN A MULTI-COMPUTER SYSTEM**

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(73) Assignee: **International Computers Limited, London (GB)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(58) Field of Search **714/4, 5, 6, 10, 714/11, 12, 13, 25, 42, 43, 47, 2, 3, 56**

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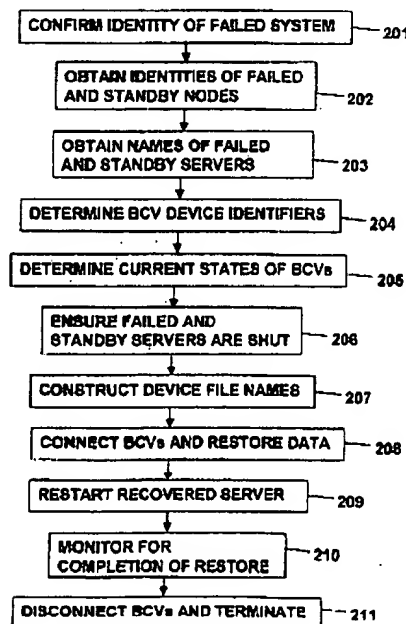
Primary Examiner—Nadeem Iqbal

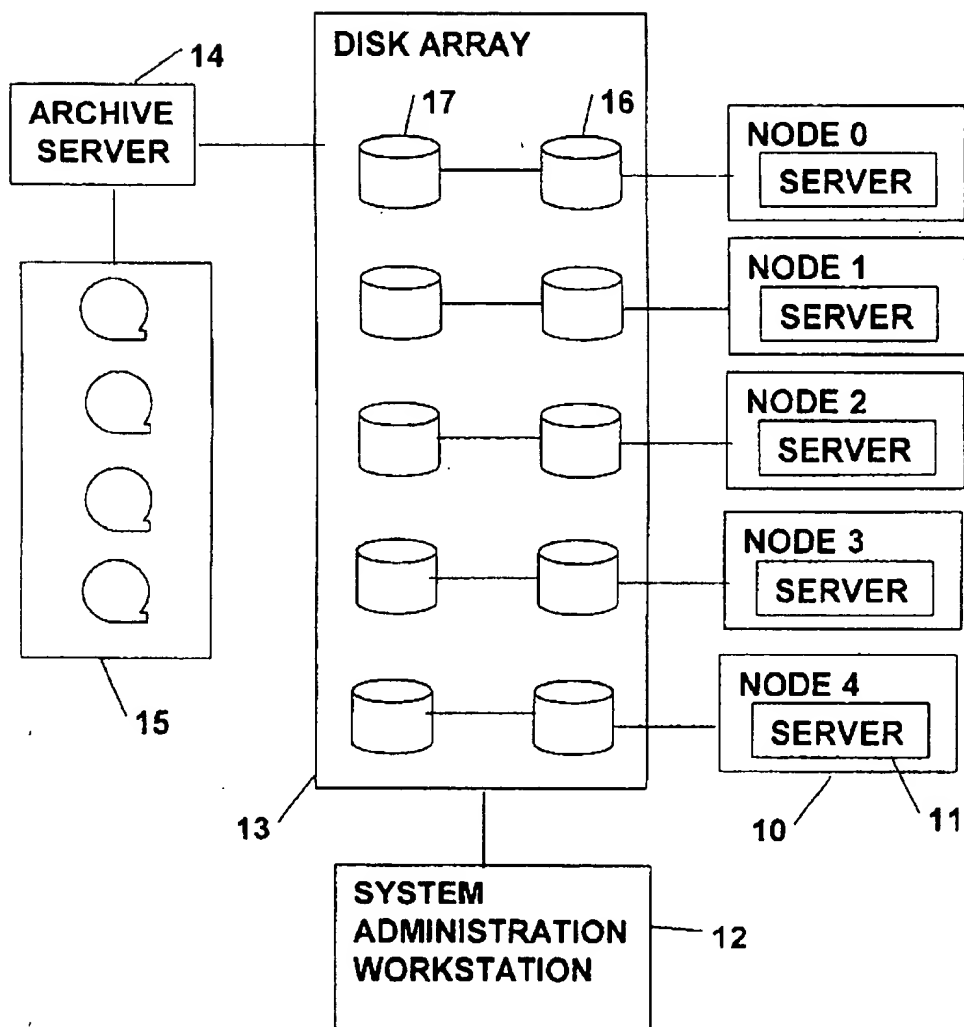
(74) Attorney, Agent, or Firm—Lee, Mann, Smith, McWilliams, Sweeney & Ohlson

(57) **ABSTRACT**

A multi-node computer system is described which includes a number of active nodes and a standby node. Each node hosts a server installation. Each server has a system disk, and a recovery disk, which holds a synchronised recovery copy of data held on the system disk. In the event of failure of a node, a recovery process is run to reconfigure the system, by connecting the recovery disk corresponding to the failed computer to the system disk of the standby computer, and copying the contents of this recovery disk to the system disk. This causes the server in the failed node to migrate to the standby node, which thus becomes an active node.

8 Claims, 3 Drawing Sheets



**FIG. 1**

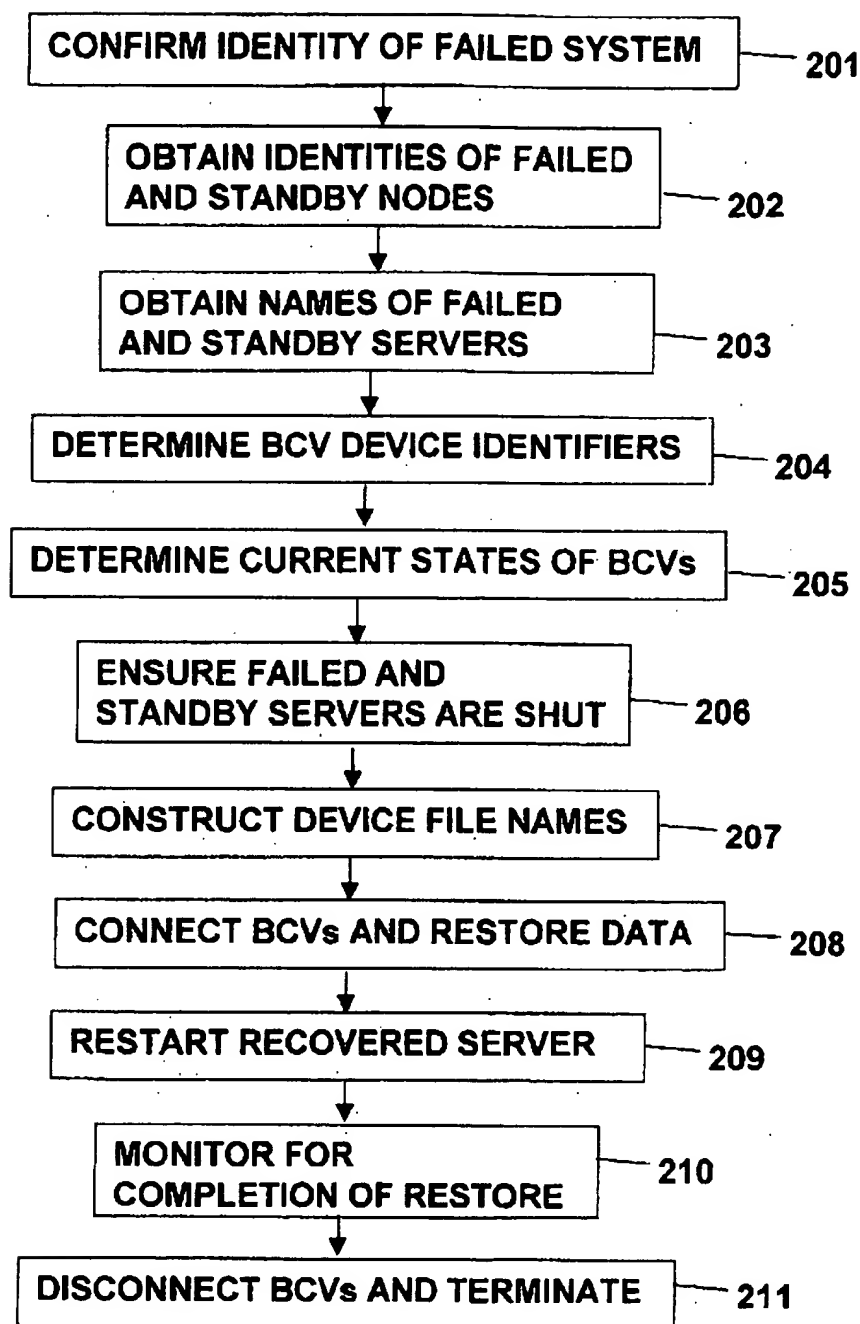
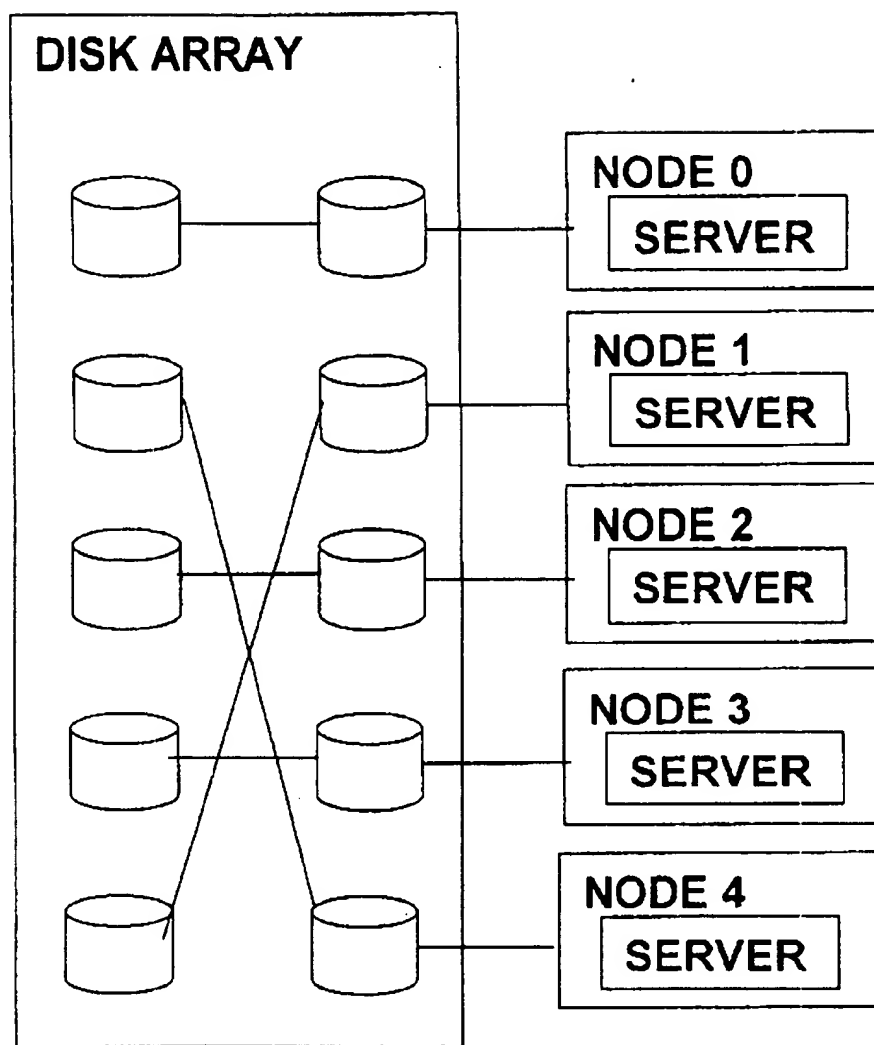


FIG. 2

**FIG.3**

RESILIENCE IN A MULTI-COMPUTER SYSTEM

BACKGROUND TO THE INVENTION

This invention relates to techniques for achieving resilience in a multi-computer system.

Such systems are often used to support a large number of users, and to store very large databases. For example, a typical system may consist of 8 server computers, supporting up to 50,000 users and may store one or more 300 GigaByte databases.

It would be desirable to be able to provide such a system based on standard server software such as for example Microsoft Exchange running under Microsoft Windows NT. However, a problem with this is that of providing resilience to failure of one of the computers. The use of cluster technology for a system of this scale would be too expensive. Also, Microsoft Exchange is not a cluster-aware application, and it is not permissible to have two instances of Exchange on the same server (even a 2-node cluster).

SUMMARY OF THE INVENTION

According to the invention, there is provided a method of operating a computer system comprising a plurality of computers, a plurality of system disk units, one for each of said computers, and a plurality of further disk units, one for each of said computers, the method comprising:

- (a) designating a plurality of said computers as active computers and designating another of said computers as a standby computer;
- (b) using the further disk units to provide a synchronised recovery copy of data held on the system disk units, and
- (c) reconfiguring the system in the event of failure of one of the active computers, by causing the standby computer to pick up the further disk unit corresponding to the failed computer.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a multi-node computer system embodying the invention.

FIG. 2 is a flow chart showing a recovery process for handling failure of one of the nodes of the system.

FIG. 3 is a block diagram showing an example of the system after reconfiguration by the recovery process.

DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

One computer system in accordance with the invention will now be described by way of example with reference to the accompanying drawings.

In the present specification, the following terms are used with specific meanings:

Node: this means an individual computer hardware configuration. In the present embodiment of the invention, each node comprises an ICL Xtraserver computer. Each node has a unique identity number.

Server: this means a specific server software installation. In the present embodiment of the invention, each server comprises a specific Microsoft NT installation. Each server has a unique server name, and is capable of being hosted (i.e. run) on any of the nodes. A server can, if necessary, be shut down and relocated to another node.

System: this means a number of servers accessing a common storage unit.

Referring to FIG. 1, this shows a system comprising $N+1$ nodes 10. In normal operation, N of the nodes are active, while the remaining one is a standby. In this example, N equals four (i.e. there are 5 nodes altogether). Each of the nodes 10 hosts a server 11.

The system also includes a system administration workstation 12, which allows a (human) operator or system administrator to monitor and control the system. Each server displays its name and current operational state on the workstation 12. One or more other systems (not shown) may also be controlled and monitored from the same workstation.

All of the nodes 10 are connected to a shared disk array 13. In this example, the disk array 13 is an EMC Symmetrix disk array. This consists of a large number of magnetic disk units, all of which are mirrored (duplexed) for resilience. In addition, the disk array includes a number of further disks, providing a Business Continuance Volume (BCV). A BCV is effectively a third plex, which can be connected to or disconnected from the primary plexes under control of EMC Timefinder software, running on the workstation 12. The BCV data can be synchronised with the primary plexes so as to provide a backup, or can be disconnected from the primary plexes, so as to provide a snapshot of the main data at a given point in time. When the BCV has been split in this way, it can be reconnected at any time and the data then copied from the primary plexes to the BCV, or vice versa, to resynchronise them.

The system also includes an archive server 14 connected to the disk array 13 and to a number of robotic magnetic tape drives 15. In operation, the archive server periodically performs an offline archive of the data in each database, by archiving the copy of the database held in the BCV to tape. When the archive is secure, the BCV is then brought back into synchronism with the main database, before again being broken away to form the recovery BCV, using the EMC TimeFinder software.

As illustrated in FIG. 1, the disk array 13 includes a number of system disks 16, one for each of the servers 11. Each system disk holds the NT operating system files and configuration files for its associated server: in other words, the system disk holds all the information that defines the "personality" of the server installation. Each of the system disks has a BCV disk 17 associated with it, holding a backup copy of the associated system disk. Normally, each BCV disk 17 is disconnected from its corresponding system disk; it is connected only if the system disk changes, so as to synchronise the two copies.

In the event of failure of one of the N active nodes 10, a recovery process is initiated on the system administration workstation 12. In this example, the recovery process comprises a script, written in the scripting language associated with the Timefinder software. The process guides the system administrator through a recovery procedure, which reconfigures the system to cause the standby node to pick up the system disk BCV of the failed node, thereby relocating the server on the failed node on to the standby node and vice versa.

The recovery process makes use of a predetermined set of device files, one for every possible combination of node and server. Since in this example there are five servers and five nodes (including the standby), there are 25 possible combinations, and hence 25 such device files are provided. Each of these files is identified by a name in the form $n(N)_is_ (S)$ where N is a node identity number, and S is the last three digits of the server name. (Other conventions could

of course be used for naming the files). Each device file contains all the information required to install the specified server on the specified node.

As illustrated in FIG. 2, the recovery process comprises the following steps:

(Step 201) The recovery process first confirms the identity of the failed system with the administrator. This step is required only if more than one system is managed from the same system administration workstation.

(Step 202) The recovery process then queries the administrator to obtain the identity numbers of the failed node and the standby node. The administrator can determine these node numbers using information displayed on the system administration workstation 12.

(Step 203) The recovery process next queries the system administrator to obtain the name of the failed server (i.e. the server currently running on the failed node). The recovery process also automatically determines the name of the standby server —this is a predetermined value for each system.

(Step 204) The recovery process also automatically determines the device identifiers for the BCVs associated with the failed server and the standby server, using a lookup table which associates each server name with a particular device identifier.

(Step 205) The recovery process then calls the BCV QUERY command in the Timefinder software, so as to determine the current states of these two BCVs. These should both be in the disconnected state.

If one or both of the BCVs is not in the disconnected state, the recovery process aborts, prompting the system administrator to call the appropriate technical support service.

(Step 206) If both of the BCVs are in the disconnected state, the recovery process continues by prompting the administrator to ensure that both the failed server and the standby server are shut down. The recovery process waits for confirmation that this has been done.

(Step 207) When both the failed server and the standby server have been shut down, the recovery process constructs two device file names as follows:

The first file name is $\alpha(W)_{-is_}(X)$ where W is the node number of the standby node and X is the last three digits of the failed server's name.

The second file name is $\alpha(Y)_{-is_}(Z)$ where Y is the node number of the failed node and Z is the last three digits of the standby server's name.

(Step 208) The recovery process then calls the Timefinder BCV RESTORE command passing it the first device file name as a parameter. This causes the BCV of the failed node to be linked to the system disk of the standby server, and initiates copying of the data from this BCV to the system disk. It can be seen that the effect of this is to relocate the server that was running on the failed node on to the standby node.

The recovery process also calls the BCV RESTORE command, passing it the second device file name as a parameter. This causes the BCV of the standby node to be linked to the system disk of the failed server, and initiates copying of the data from this BCV to the system disk. The effect of this is therefore to relocate the server that was running on the standby node on to the failed node.

As an example, FIG. 3 shows the case where node 1 has failed, and where node 4 is the standby. As shown, the BCV disk of the standby node is linked to the system disk of the failed node, and the BCV of the failed node is linked to the system disk of the standby

While the restore commands are running, the recovery process checks for error responses, and reports any such

responses to the administrator. It also writes all actions to a log file immediately prior to the action.

(Step 209) After issuing the restore commands, the recovery process prompts the administrator to restart the recovered server (i.e. the server which has migrated from the failed node to the standby node), stating the new node name it will run on. The standby node therefore now becomes an active node.

It should be noted that the restore commands run in the background and typically take about an hour to complete. However, the recovered server can be restarted immediately, and its data accessed, without waiting for the restore commands to complete.

(Step 210) The recovery procedure monitors for completion of the BCV restore operations, using the Timefinder BCV Query command.

(Step 211) When the restore operations are complete, the recovery procedure issues a Timefinder BCV Split command, which disconnects the BCVs from the system disks. Recovery is now complete, and the recovery process terminates.

Once the failed node has been fixed, it can be rebooted as required, and will become the standby server. The recovery procedure can then be repeated if any of the active nodes fails.

Some possible modifications

It will be appreciated that many modifications may be made to the system described above without departing from the scope of the present invention. For example, different numbers of disks and computers may be used. Also, the invention may be implemented in other operating systems, and using other hardware configurations. Moreover, instead of implementing the recovery procedure by means of a script, it could for example be integrated into the operating system.

What is claimed is:

1. A method of providing resilience in a multi-node computer system comprising a plurality of computer hardware nodes, including a plurality of active nodes and at least one standby node, the method comprising:

- (a) associating at least one system disk and at least one backup disk with each of the nodes;
- (b) hosting a plurality of server software installations on respective ones of the nodes, each of the server software installations being defined by information stored on a respective one of the system disks;
- (c) maintaining synchronized backup copies of the system disks on respective ones of the backup disks; and
- (d) in the event of failure of one of the active nodes, reconfiguring the system to cause the standby node to pick up the backup disk associated with the failed node, and relocating the server software installation currently hosted on the failed node onto the standby node.

2. A method according to claim 1 wherein the step of reconfiguring the system further comprises copying of information from the backup disk associated with the failed node to the system disk associated with the standby node.

3. A method according to claim 2 further including restarting the standby computer while the copying of information is being performed in the background.

4. A method according to claim 3, including the step of maintaining a set of device files, one for each possible combination of hardware node and server software installation, wherein the step of reconfiguring the system comprises selecting two of the device files that correspond to the new configurations of the failed computer and the standby computer and using the selected device files to control reconfiguration of the system.

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5. A multi-node computer system comprising:
- (a) a plurality of computer hardware nodes, including a plurality of active nodes and at least one standby node;
 - (b) a plurality of system disks;
 - (c) a plurality of backup disks holding synchronized backup copies of the system disks;
 - (d) means for associating at least one of the system disks and at least one of the backup disks with each of the nodes;
 - (e) a plurality of server software installations hosted on respective ones of the nodes, the server software installations being defined by information stored on the system disks of the respective nodes; and
 - (f) means for reconfiguring the system in the event of failure of one of the active nodes, to cause the standby node to pick up the backup disk associated with the failed node, and relocating the server software instal-

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lation currently hosted on the failed node onto the standby node.

6. A system according to claim 5, wherein the means for reconfiguring the system includes means for copying of information from the backup disk associated with the failed node to the system disk associated with the standby node.

7. A system according to claim 6 further including means for restarting the standby computer while the copying of information is being performed in the background.

8. A system according to claim 3, including a set of device files, one for each possible combination of hardware node and server software installation, wherein the means for reconfiguring the system comprises means for selecting two of the device files that correspond to the new configurations of the failed computer and the standby computer and for using the selected device files to control reconfiguration of the system.

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383 U.S. 1

**GRAHAM ET AL. v. JOHN DEERE CO. OF KANSAS CITY ET AL.
CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE EIGHTH
CIRCUIT.**

No. 11.

Argued October 14, 1965.

Decided February 21, 1966. *

[Footnote *] Together with No. 37, Calmar, Inc. v. Cook Chemical Co., and No. 43, Colgate-Palmolive Co. v. Cook Chemical Co., also on certiorari to the same court.

In No. 11 petitioners sued for infringement of a patent, consisting of a combination of old mechanical elements, for a device designed to absorb shock from plow shanks in rocky soil to prevent damage to the plow. In 1955 the Fifth Circuit held the patent valid, ruling that a combination is patentable when it produces an "old result in a cheaper and otherwise more advantageous way." Here the Eighth Circuit held that since there was no new result in the combination the patent was invalid. Petitioners in Nos. 37 and 43 filed actions for declaratory judgments declaring invalid respondent's patent relating to a plastic finger sprayer with a "hold-down" cap used as a built-in dispenser for containers with liquids, principally insecticides. By cross-action respondent claimed infringement. The District Court and the Court of Appeals sustained the patent. Held: The patents do not meet the test of the "nonobvious" nature of the "subject matter sought to be patented" to a person having ordinary skill in the pertinent art, set forth in 103 of the Patent Act of 1952, and are therefore invalid. Pp. 3-37. [383 U.S. 1. 2]

(a) In carrying out the constitutional command of Art. I, 8, that a patent system "promote the Progress of . . . useful Arts," Congress established the two statutory requirements of novelty and utility in the Patent Act of 1793. Pp. 3, 6, 12.

(b) This Court in *Hotchkiss v. Greenwood*, 11 How. 248 (1851), additionally conditioned the issuance of a patent upon the evidence of more ingenuity and skill than that possessed by an ordinary mechanic acquainted with the business. P. 11.

(c) In 103 of the 1952 Patent Act Congress added the statutory nonobvious subject matter requirement, originally expounded in *Hotchkiss*, which merely codified judicial precedents requiring a comparison of the subject matter sought to be patented and the prior art, tying patentable inventions to advances in the art. Although 103 places emphasis upon inquiries into obviousness, rather than into "invention," the general level of innovation necessary to sustain patentability remains unchanged under the 1952 Act. Pp. 14-17.

(d) This section permits a more practical test of patentability. The determination of "nonobviousness" is made after establishing the scope and content of prior art, the differences between the prior art and the claims at issue, and the level of ordinary skill in the pertinent art. P. 17.

(e) With respect to each patent involved here the differences between the claims in issue and the pertinent

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prior art would have been obvious to a person reasonably skilled in that art. Pp. 25-26, 37.

333 F.2d 529, affirmed; 336 F.2d 110, reversed and remanded.

Orville O. Gold argued the cause for petitioners in No. 11. With him on the brief was Claude A. Fishburn. Dennis G. Lyons argued the cause for petitioners in Nos. 37 and 43. With him on the briefs for petitioner in No. 37 were Victor H. Kramer and Francis G. Cole. On the brief for petitioner in No. 43 were George H. Mortimer and Howard A. Crawford.

S. Tom Morris argued the cause for respondents in No. 11. With him on the brief were W. W. Gibson and Thomas E. Scofield. Gordon D. Schmidt argued the cause for respondent in Nos. 37 and 43. With him on [383 U.S. 1, 3] the brief were Carl E. Enggas, Hugh B. Cox and Charles A. Miller.

Briefs of amici curiae in No. 11 were filed by Roger Robb for the American Bar Association; by Stanton T. Lawrence, Jr., for the New York Patent Law Association; by George E. Frost for the Illinois State Bar Association; by J. Vincent Martin, Alfred H. Evans and Russell E. Schlorff for the State Bar of Texas; and by Robert W. Hamilton for the School of Law of the University of Texas.

MR. JUSTICE CLARK delivered the opinion of the Court.

After a lapse of 15 years, the Court again focuses its attention on the patentability of inventions under the standard of Art. I, § 8, cl. 8, of the Constitution and under the conditions prescribed by the laws of the United States. Since our last expression on patent validity, *A. & P. Tea Co. v. Supermarket Corp.*, 340 U.S. 147 (1950), the Congress has for the first time expressly added a third statutory dimension to the two requirements of novelty and utility that had been the sole statutory test since the Patent Act of 1793. This is the test of obviousness, i. e., whether "the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made." 103 of the Patent Act of 1952, 35 U.S.C. 103 (1964 ed.).

The questions, involved in each of the companion cases before us, are what effect the 1952 Act had upon traditional statutory and judicial tests of patentability and what definitive tests are now required. We have concluded that the 1952 Act was intended to codify judicial precedents embracing the principle long ago [383 U.S. 1, 4] announced by this Court in *Hotchkiss v. Greenwood*, 11 How. 248 (1851), and that, while the clear language of 103 places emphasis on an inquiry into obviousness, the general level of innovation necessary to sustain patentability remains the same.

I.

The Cases.

(a). No. 11, *Graham v. John Deere Co.*, an infringement suit by petitioners, presents a conflict between two Circuits over the validity of a single patent on a "Clamp for vibrating Shank Plows." The invention, a combination of old mechanical elements, involves a device designed to absorb shock from plow shanks as they plow through rocky soil and thus to prevent damage to the plow. In 1955, the Fifth Circuit had held the patent valid under its rule that when a combination produces an "old result in a cheaper and otherwise more advantageous way," it is patentable. *Jeoffroy Mfg., Inc. v. Graham*, 219 F.2d 511, cert. denied, 350 U.S. 826. In 1964, the Eighth Circuit held, in the case at bar, that there was no new result in the patented combination and that the patent was, therefore, not valid. 333 F.2d 529, reversing 216 F. Supp. 272. We granted certiorari, 379 U.S. 956. Although we have determined that neither Circuit applied the correct test, we conclude that the patent is invalid under 103 and, therefore, we affirm the judgment of the Eighth Circuit.

(b). No. 37, *Calmar, Inc. v. Cook Chemical Co.*, and No. 43, *Colgate-Palmolive Co. v. Cook Chemical Co.*, both from the Eighth Circuit, were separate declaratory judgment actions, but were filed contemporaneously. Petitioner in Calmar is the manufacturer of a finger-operated sprayer with a "hold-down" cap of the type commonly seen on grocers' shelves inserted in bottles of insecticides and other liquids prior to shipment. Petitioner in Colgate-Palmolive is a purchaser of the sprayers [383 U.S. 1, 5] and uses them in the distribution of its products. Each action sought a declaration of invalidity and noninfringement of a patent on similar sprayers issued to Cook Chemical as assignee of Baxter I. Scoggin, Jr., the inventor. By cross-action, Cook Chemical claimed infringement. The actions were consolidated for trial and the patent was sustained by the District Court. 220 F. Supp. 414. The Court of Appeals affirmed, 336 F.2d 110, and we granted certiorari, 380 U.S. 949. We reverse.

Manifestly, the validity of each of these patents turns on the facts. The basic problems, however, are the same in each case and require initially a discussion of the constitutional and statutory provisions covering the patentability of the inventions.

II.

At the outset it must be remembered that the federal patent power stems from a specific constitutional provision which authorizes the Congress "To promote the Progress of . . . useful Arts, by securing for limited Times to . . . Inventors the exclusive Right to their . . . Discoveries." Art. I, 8, cl. 8. ¹ The clause is both a grant of power and a limitation. This qualified authority, unlike the power often exercised in the sixteenth and seventeenth centuries by the English Crown, is limited to the promotion of advances in the "useful arts." It was written against the backdrop of the practices - eventually curtailed by the Statute of Monopolies - of the Crown in granting monopolies to court favorites in goods or businesses which had long before been enjoyed by the public. See Meinhardt, *Inventions, Patents and Monopoly*, pp. 30-35 (London, 1946). The Congress in the [383 U.S. 1, 6] exercise of the patent power may not overreach the restraints imposed by the stated constitutional purpose. Nor may it enlarge the patent monopoly without regard to the innovation, advancement or social benefit gained thereby. Moreover, Congress may not authorize the issuance of patents whose effects are to remove existent knowledge from the public domain, or to restrict free access to materials already available. Innovation, advancement, and things which add to the sum of useful knowledge are inherent requisites in a patent system which by constitutional command must "promote the Progress of . . . useful Arts." This is the standard expressed in the Constitution and it may not be ignored. And it is in this light that patent validity "requires reference to a standard written into the Constitution." *A. & P. Tea Co. v. Supermarket Corp.*, supra, at 154 (concurring opinion).

Within the limits of the constitutional grant, the Congress may, of course, implement the stated purpose of the Framers by selecting the policy which in its judgment best effectuates the constitutional aim. This is but a corollary to the grant to Congress of any Article I power. *Gibbons v. Ogden*, 9 Wheat. 1. Within the scope established by the Constitution, Congress may set out conditions and tests for patentability. *McClurg v. Kingsland*, 1 How. 202, 206. It is the duty of the Commissioner of Patents and of the courts in the administration of the patent system to give effect to the constitutional standard by appropriate application, in each case, of the statutory scheme of the Congress.

Congress quickly responded to the bidding of the Constitution by enacting the Patent Act of 1790 during the second session of the First Congress. It created an agency in the Department of State headed by the Secretary of State, the Secretary of the Department of War [383 U.S. 1, 7] and the Attorney General, any two of whom could issue a patent for a period not exceeding 14 years to any petitioner that "hath . . . invented or discovered any useful art, manufacture, . . . or device, or any improvement therein not before known or used" if the board found that "the invention or discovery [was] sufficiently useful and important . . ." 1 Stat. 110. This group, whose members administered the patent system along with their other public duties, was known by its own designation as "Commissioners for the Promotion of Useful Arts."

Thomas Jefferson, who as Secretary of State was a member of the group, was its moving spirit and might well be called the "first administrator of our patent system." See Federico, *Operation of the Patent Act of 1790*, 18 J. Pat. Off. Soc. 237, 238 (1936). He was not only an administrator of the patent system under the 1790 Act, but was also the author of the 1793 Patent Act. In addition, Jefferson was himself an inventor of great note. His unpatented improvements on plows, to mention but one line of his inventions, won acclaim and recognition on both sides of the Atlantic. Because of his active interest and influence in the early development of the patent system, Jefferson's views on the general nature of the limited patent monopoly under the Constitution, as well as his conclusions as to conditions for patentability under the statutory scheme, are worthy of note.

Jefferson, like other Americans, had an instinctive aversion to monopolies. It was a monopoly on tea that sparked the Revolution and Jefferson certainly did not favor an equivalent form of monopoly under the new government. His abhorrence of monopoly extended initially to patents as well. From France, he wrote to Madison (July 1788) urging a Bill of Rights provision restricting monopoly, and as against the argument that [383 U.S. 1, 8] limited monopoly might serve to incite "ingenuity," he argued forcefully that "the benefit even of limited monopolies is too doubtful to be opposed to that of their general suppression," *V Writings of Thomas Jefferson*, at 47 (Ford ed., 1895).

His views ripened, however, and in another letter to Madison (Aug. 1789) after the drafting of the Bill of Rights, Jefferson stated that he would have been pleased by an express provision in this form:

"Art. 9. Monopolies may be allowed to persons for their own productions in literature & their own inventions in the arts, for a term not exceeding - years but for no longer term & no other purpose." *Id.*, at 113.

And he later wrote:

"Certainly an inventor ought to be allowed a right to the benefit of his invention for some certain time. . . . Nobody wishes more than I do that ingenuity should receive a liberal encouragement." Letter to Oliver Evans (May 1807), *V Writings of Thomas Jefferson*, at 75-76 (Washington ed.).

Jefferson's philosophy on the nature and purpose of the patent monopoly is expressed in a letter to Isaac McPherson (Aug. 1813), a portion of which we set out in the margin. ² He rejected a natural-rights theory in [383 U.S. 1, 9] intellectual property rights and clearly recognized the social and economic rationale of the patent system. The patent monopoly was not designed to secure to the inventor his natural right in his discoveries. Rather, it was a reward, an inducement, to bring forth new knowledge. The grant of an exclusive right to an

invention was the creation of society - at odds with the inherent free nature of disclosed ideas - and was not to be freely given. Only inventions and discoveries which furthered human knowledge, and were new and useful, justified the special inducement of a limited private monopoly. Jefferson did not believe in granting patents for small details, obvious improvements, or frivolous devices. His writings evidence his insistence upon a high level of patentability.

As a member of the patent board for several years, Jefferson saw clearly the difficulty in "drawing a line between the things which are worth to the public the embarrassment of an exclusive patent, and those which are not." The board on which he served sought to draw such a line and formulated several rules which are preserved in [383 U.S. 1, 10] Jefferson's correspondence. ³ Despite the board's efforts, Jefferson saw "with what slow progress a system of general rules could be matured." Because of the "abundance" of cases and the fact that the investigations occupied "more time of the members of the board than they could spare from higher duties, the whole was turned over to the judiciary, to be matured into a system, under which every one might know when his actions were safe and lawful." Letter to McPherson, *supra*, at 181, 182. Apparently Congress agreed with Jefferson and the board that the courts should develop additional conditions for patentability. Although the Patent Act was amended, revised or codified some 50 times between 1790 and 1950, Congress steered clear of a statutory set of requirements other than the bare novelty and utility tests reformulated in Jefferson's draft of the 1793 Patent Act.

III.

The difficulty of formulating conditions for patentability was heightened by the generality of the constitutional grant and the statutes implementing it, together with the underlying policy of the patent system that "the things which are worth to the public the embarrassment [383 U.S. 1, 11] of an exclusive patent," as Jefferson put it, must outweigh the restrictive effect of the limited patent monopoly. The inherent problem was to develop some means of weeding out those inventions which would not be disclosed or devised but for the inducement of a patent.

This Court formulated a general condition of patentability in 1851 in *Hotchkiss v. Greenwood*, 11 How. 248. The patent involved a mere substitution of materials - porcelain or clay for wood or metal in doorknobs - and the Court condemned it, holding: 4

"[U]nless more ingenuity and skill . . . were required . . . than were possessed by an ordinary mechanic acquainted with the business, there was an absence of that degree of skill and ingenuity which constitute essential elements of every invention. In other words, the improvement is the work of the skilful mechanic, not that of the inventor." At p. 267.

Hotchkiss, by positing the condition that a patentable invention evidence more ingenuity and skill than that possessed by an ordinary mechanic acquainted with the business, merely distinguished between new and useful innovations that were capable of sustaining a patent and those that were not. The *Hotchkiss* test laid the cornerstone of the judicial evolution suggested by Jefferson and left to the courts by Congress. The language in the case, and in those which followed, gave birth to "invention" as a word of legal art signifying patentable inventions. Yet, as this Court has observed, "[t]he truth is the word ['invention'] cannot be defined in such manner as to afford any substantial aid in determining whether a particular device involves an exercise of the inventive faculty [383 U.S. 1, 12] or not." *McClain v. Ortmayer*, 141 U.S. 419, 427 (1891); *A. & P. Tea Co. v. Supermarket Corp.*, *supra*, at 151. Its use as a label brought about a large variety of opinions as to its meaning both in the Patent Office, in the courts, and at the bar. The *Hotchkiss* formulation, however, lies not in any label, but in its functional approach to questions of patentability. In practice, *Hotchkiss* has required a comparison between the subject matter of the patent, or patent application, and the background skill of the calling. It has been from this comparison that patentability was in each case determined.

IV.

The 1952 Patent Act.

The Act sets out the conditions of patentability in three sections. An analysis of the structure of these three sections indicates that patentability is dependent upon three explicit conditions: novelty and utility as articulated and defined in 101 and 102, and nonobviousness, the new statutory formulation, as set out in 103. The first two sections, which trace closely the 1874 codification, express the "new and useful" tests which have always existed in the statutory scheme and, for our purposes here, need no clarification. 5 The pivotal [383 U.S. 1, 13] section around which the present controversy centers is 103. It provides:

" 103. Conditions for patentability; non-obvious subject matter

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made." [383 U.S. 1, 14]

The section is cast in relatively unambiguous terms. Patentability is to depend, in addition to novelty and utility, upon the "non-obvious" nature of the "subject matter sought to be patented" to a person having ordinary skill in the pertinent art.

The first sentence of this section is strongly reminiscent of the language in *Hotchkiss*. Both formulations place emphasis on the pertinent art existing at the time the invention was made and both are implicitly tied to advances in that art. The major distinction is that Congress has emphasized "nonobviousness" as the operative test of the section, rather than the less definite "invention" language of *Hotchkiss* that Congress thought had led to "a large variety" of expressions in decisions and writings. In the title itself the Congress used the phrase "Conditions for patentability; non-obvious subject matter" (*italics added*), thus focusing upon "nonobviousness" rather than "invention." 6 The Senate and House Reports, S. Rep. No. 1979, 82d Cong., 2d Sess. (1952); H. R. Rep. No. 1923, 82d Cong., 2d Sess. (1952), reflect this emphasis in these terms:

"Section 103, for the first time in our statute, provides a condition which exists in the law and has existed for more than 100 years, but only by reason of decisions of the courts. An invention which has been made, and which is new in the sense that the same thing has not been made before, may still not be patentable if the difference between the new thing and what was known before is not considered sufficiently great to warrant a patent. That has been expressed in a large variety of ways in decisions of [383 U.S. 1, 15] the courts and in writings. Section 103 states this requirement in the title. It refers to the difference between the subject matter sought to be patented and the prior art, meaning what was known before as described in section 102. If this difference is such that the subject matter as a whole would have been obvious at the time to a person skilled in the art, then the subject matter cannot be patented.

"That provision paraphrases language which has often been used in decisions of the courts, and the section is added to the statute for uniformity and definiteness. This section should have a stabilizing effect and minimize great departures which have appeared in some cases." H. R. Rep., *supra*, at 7; S. Rep., *supra*, at 6.

It is undisputed that this section was, for the first time, a statutory expression of an additional requirement for patentability, originally expressed in *Hotchkiss*. It also seems apparent that Congress intended by the last sentence of 103 to abolish the test it believed this Court announced in the controversial phrase "flash of creative genius," used in *Cuno Corp. v. Automatic Devices Corp.*, 314 U.S. 84 (1941). 7 [383 U.S. 1, 16]

It is contended, however, by some of the parties and by several of the amici that the first sentence of 103 was intended to sweep away judicial precedents and to lower the level of patentability. Others contend that the Congress intended to codify the essential purpose reflected in existing judicial precedents - the rejection of insignificant variations and innovations of a commonplace sort - and also to focus inquiries under 103 upon nonobviousness, rather than upon "invention," as a means of achieving more stability and predictability in determining patentability and validity.

The Reviser's Note to this section, 8 with apparent reference to *Hotchkiss*, recognizes that judicial requirements as to "lack of patentable novelty [*have*] been followed since at least as early as 1850." The note indicates that the section was inserted because it "may have some stabilizing effect, and also to serve as a basis for the addition at a later time of some criteria which may be worked out." To this same effect are the reports of both Houses, *supra*, which state that the first sentence [383 U.S. 1, 17] of the section "paraphrases language which has often been used in decisions of the courts, and the section is added to the statute for uniformity and definiteness."

We believe that this legislative history, as well as other sources, 9 shows that the revision was not intended by Congress to change the general level of patentable invention. We conclude that the section was intended merely as a codification of judicial precedents embracing the *Hotchkiss* condition, with congressional directions that inquiries into the obviousness of the subject matter sought to be patented are a prerequisite to patentability.

V.

Approached in this light, the 103 additional condition, when followed realistically, will permit a more practical test of patentability. The emphasis on nonobviousness is one of inquiry, not quality, and, as such, comports with the constitutional strictures.

While the ultimate question of patent validity is one of law, *A. & P. Tea Co. v. Supermarket Corp.*, *supra*, at 155, the 103 condition, which is but one of three conditions, each of which must be satisfied, lends itself to several basic factual inquiries. Under 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances [383 U.S. 1, 18] surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy. See Note, Subtests of "Nonobviousness": A Nontechnical Approach to Patent Validity, 112 U. Pa. L. Rev. 1169 (1964).

This is not to say, however, that there will not be difficulties in applying the nonobviousness test. What is obvious is not a question upon which there is likely to be uniformity of thought in every given factual context. The difficulties, however, are comparable to those encountered daily by the courts in such frames of reference as negligence and scienter, and should be amenable to a case-by-case development. We believe that strict observance of the requirements laid down here will result in that uniformity and definiteness which Congress called for in the 1952 Act.

While we have focused attention on the appropriate standard to be applied by the courts, it must be remembered that the primary responsibility for sifting out unpatentable material lies in the Patent Office. To await litigation is - for all practical purposes - to debilitate the patent system. We have observed a notorious difference between the standards applied by the Patent Office and by the courts. While many reasons can be adduced to explain the discrepancy, one may well be the free rein often exercised by Examiners in their use of the concept of "invention." In this connection we note that the Patent Office is confronted with a most difficult task. Almost 100,000 applications for patents are filed each year. Of these, about 50,000 are granted and the backlog now runs well over 200,000. 1965 Annual Report of the Commissioner of Patents 13-14. This is itself a compelling reason for the Commissioner to strictly adhere to the 1952 Act as interpreted here. This would, we believe, not only expedite disposition but [383 U.S. 1, 19] bring about a closer concurrence between administrative and judicial precedent. 10

Although we conclude here that the inquiry which the Patent Office and the courts must make as to patentability must be beamed with greater intensity on the requirements of 103, it bears repeating that we find no change in the general strictness with which the overall test is to be applied. We have been urged to find in 103 a relaxed standard, supposedly a congressional reaction to the "increased standard" applied by this Court in its decisions over the last 20 or 30 years. The standard has remained invariable in this Court. Technology, however, has advanced - and with remarkable rapidity in the last 50 years. Moreover, the ambit of applicable art in given fields of science has widened by disciplines unheard of a half century ago. It is but an evenhanded application to require that those persons granted the benefit of a patent monopoly be charged with an awareness of these changed conditions. The same is true of the less technical, but still useful arts. He who seeks to build a better mousetrap today has a long path to tread before reaching the Patent Office.

VI.

We now turn to the application of the conditions found necessary for patentability to the cases involved here:

A. The Patent in Issue in No. 11, Graham v. John Deere Co.

This patent, No. 2,627,798 (hereinafter called the '798 patent) relates to a spring clamp which permits plow shanks to be pushed upward when they hit obstructions [383 U.S. 1, 20] in the soil, and then springs the shanks back into normal position when the obstruction is passed over. The device, which we show diagrammatically in the accompanying sketches (Appendix, Fig. 1), is fixed to the plow frame as a unit. The mechanism around which the controversy centers is basically a hinge. The top half of it, known as the upper plate (marked 1 in the sketches), is a heavy metal piece clamped to the plow frame (2) and is stationary relative to the plow frame. The lower half of the hinge, known as the hinge plate (3), is connected to the rear of the upper plate by a hinge pin (4) and rotates downward with respect to it. The shank (5), which is bolted to the forward end of the hinge plate (at 6), runs beneath the plate and parallel to it for about nine inches, passes through a stirrup (7), and then continues backward for several feet curving down toward the ground. The chisel (8), which does the actual plowing, is attached to the rear end of the shank. As the plow frame is pulled forward, the chisel rips through the soil, thereby plowing it. In the normal position, the hinge plate and the shank are kept tight against the upper plate by a spring (9), which is atop the upper plate. A rod (10) runs through the center of the spring, extending down through holes in both plates and the shank. Its upper end is bolted to the top of the spring while its lower end is hooked against the underside of the shank.

When the chisel hits a rock or other obstruction in the soil, the obstruction forces the chisel and the rear portion of the shank to move upward. The shank is pivoted (at 11) against the rear of the hinge plate and pries open the hinge against the closing tendency of the spring. (See sketch labeled "Open Position," Appendix, Fig. 1.) This closing tendency is caused by the fact that, as the hinge is opened, the connecting rod is pulled downward and the spring is compressed. When the obstruction [383 U.S. 1, 21] is passed over, the upward force on the chisel disappears and the spring pulls the shank and hinge plate back into their original position. The lower, rear portion of the hinge plate is constructed in the form of a stirrup (7) which brackets the shank, passing around and beneath it. The shank fits loosely into the stirrup (permitting a slight up and down play). The stirrup is designed to prevent the shank from recoiling away from the hinge plate, and thus prevents excessive strain on the shank near its bolted connection. The stirrup also girds the shank, preventing it from fishtailing from side to side.

In practical use, a number of spring-hinge-shank combinations are clamped to a plow frame, forming a set of ground-working chisels capable of withstanding the shock of rocks and other obstructions in the soil without breaking the shanks.

Background of the Patent.

Chisel plows, as they are called, were developed for plowing in areas where the ground is relatively free from rocks or stones. Originally, the shanks were rigidly attached to the plow frames. When such plows were used in the rocky, glacial soils of some of the Northern States, they were found to have serious defects. As the chisels hit buried rocks, a vibratory motion was set up and tremendous forces were transmitted to the shank near its connection to the frame. The shanks would break. Graham, one of the petitioners, sought to meet that problem, and in 1950 obtained a patent, U.S. No. 2,493,811 (hereinafter '811), on a spring clamp which solved some of the difficulties. Graham and his companies manufactured and sold the '811 clamps. In 1950, Graham modified the '811 structure and filed for a patent. That patent, the one in issue, was granted in 1953. This suit against competing plow manufacturers resulted from charges by petitioners that several of respondents' devices infringed the '798 patent. [383 U.S. 1, 22]

The Prior Art.

Five prior patents indicating the state of the art were cited by the Patent Office in the prosecution of the '798 application. Four of these patents, 10 other United States patents and two prior-use spring-clamp arrangements not of record in the '798 file wrapper were relied upon by respondents as revealing the prior art. The District Court and the Court of Appeals found that the prior art "as a whole in one form or another contains all of the mechanical elements of the 798 Patent." One of the prior-use clamp devices not before the Patent Examiner - Glencoe - was found to have "all of the elements."

We confine our discussion to the prior patent of Graham, '811, and to the Glencoe clamp device, both among the references asserted by respondents. The Graham '811 and '798 patent devices are similar in all elements, save two: (1) the stirrup and the bolted connection of the shank to the hinge plate do not appear in '811; and (2) the position of the shank is reversed, being placed in patent '811 above the hinge plate, sandwiched between it and the upper plate. The shank is held in place by the spring rod which is hooked against the bottom of the hinge plate passing through a slot in the shank. Other differences are of no consequence to our examination. In practice the '811 patent arrangement permitted the shank to wobble or fishtail because it was not rigidly fixed to the hinge plate; moreover, as the hinge plate was below the shank, the latter caused wear on the upper plate, a member difficult to repair or replace.

Graham's '798 patent application contained 12 claims. All were rejected as not distinguished from the Graham '811 patent. The inverted position of the shank was specifically rejected as was the bolting of the shank to the hinge plate. The Patent Office examiner found these to be "matters of design well within the expected skill of [383 U.S. 1, 23] the art and devoid of invention." Graham withdrew the original claims and substituted the two new ones which are substantially those in issue here. His contention was that wear was reduced in patent '798 between the shank and the heel or rear of the upper plate. 11 He also emphasized several new features, the relevant one here being that the bolt used to connect the hinge plate and shank maintained the upper face of the shank in continuing and constant contact with the underface of the hinge plate.

Graham did not urge before the Patent Office the greater "flexing" qualities of the '798 patent arrangement which he so heavily relied on in the courts. The sole element in patent '798 which petitioners argue before us is the interchanging of the shank and hinge plate and the consequences flowing from this arrangement. The contention is that this arrangement - which petitioners claim is not disclosed in the prior art - permits the shank to flex under stress for its entire length. As we have sketched (see sketch, "Graham '798 Patent" in Appendix, Fig. 2), when the chisel hits an obstruction the resultant force (A) pushes the rear of the shank upward and the shank pivots against the rear of the hinge plate at (C). The natural tendency is for that portion of the shank between the pivot point and the bolted connection (i. e., between C and D) to bow downward and away from the hinge plate. The maximum distance [383 U.S. 1, 24] (B) that the shank moves away from the plate is slight - for emphasis, greatly exaggerated in the sketches. This is so because of the strength of the shank and the short - nine inches or so - length of that portion of the shank between (C) and (D). On the contrary, in patent '811 (see sketch, "Graham '811 Patent" in Appendix, Fig. 2), the pivot point is the upper plate at point (c); and while the tendency for the shank to bow between points (c) and (d) is the same as in '798, the shank is restricted because of the underlying hinge plate and cannot flex as freely. In practical effect, the shank flexes only between points (a) and (c), and not along the entire length of the shank, as in '798. Petitioners say that this difference in flex, though small, effectively absorbs the tremendous forces of the shock of obstructions whereas prior art arrangements failed.

The Obviousness of the Differences.

We cannot agree with petitioners. We assume that the prior art does not disclose such an arrangement as petitioners claim in patent '798. Still we do not believe that the argument on which petitioners' contention is bottomed supports the validity of the patent. The tendency of the shank to flex is the same in all cases. If free-flexing, as petitioners now argue, is the crucial difference above the prior art, then it appears evident that the desired result would be obtainable by not boxing the shank within the confines of the hinge. 12 The only other effective place available in the arrangement was to attach it below the hinge plate and run it through a [383 U.S. 1, 25] stirrup or bracket that would not disturb its flexing qualities. Certainly a person having ordinary skill in the prior art, given the fact that the flex in the shank could be utilized more effectively if allowed to run the entire

length of the shank, would immediately see that the thing to do was what Graham did, i. e., invert the shank and the hinge plate.

Petitioners' argument basing validity on the free-flex theory raised for the first time on appeal is reminiscent of *Lincoln Engineering Co. v. Stewart-Warner Corp.*, 303 U.S. 545 (1938), where the Court called such an effort "an afterthought. No such function . . . is hinted at in the specifications of the patent. If this were so vital an element in the functioning of the apparatus it is strange that all mention of it was omitted." At p. 550. No "flexing" argument was raised in the Patent Office. Indeed, the trial judge specifically found that "flexing is not a claim of the patent in suit . . ." and would not permit interrogation as to flexing in the accused devices. Moreover, the clear testimony of petitioners' experts shows that the flexing advantages flowing from the '798 arrangement are not, in fact, a significant feature in the patent. 13

We find no nonobvious facets in the '798 arrangement. The wear and repair claims were sufficient to overcome [383 U.S. 1, 26] the patent examiner's original conclusions as to the validity of the patent. However, some of the prior art, notably Glencoe, was not before him. There the hinge plate is below the shank but, as the courts below found, all of the elements in the '798 patent are present in the Glencoe structure. Furthermore, even though the position of the shank and hinge plate appears reversed in Glencoe, the mechanical operation is identical. The shank there pivots about the underside of the stirrup, which in Glencoe is above the shank. In other words, the stirrup in Glencoe serves exactly the same function as the heel of the hinge plate in '798. The mere shifting of the wear point to the heel of the '798 hinge plate from the stirrup of Glencoe - itself a part of the hinge plate - presents no operative mechanical distinctions, much less nonobvious differences.

B. The Patent in Issue in No. 37, Calmar, Inc. v. Cook Chemical Co., and in No. 43, Colgate-Palmolive Co. v. Cook Chemical Co.

The single patent 14 involved in these cases relates to a plastic finger sprayer with a "hold-down" lid used as a built-in dispenser for containers or bottles packaging liquid products, principally household insecticides. Only the first two of the four claims in the patent are involved here and we, therefore, limit our discussion to them. We do not set out those claims here since they are printed in 220 F. Supp., at 417-418.

In essence the device here combines a finger-operated pump sprayer, mounted in a container or bottle by means of a container cap, with a plastic overcap which screws over the top of and depresses the sprayer (see Appendix, [383 U.S. 1, 27] Fig. 3). The pump sprayer passes through the container cap and extends down into the liquid in the container; the overcap fits over the pump sprayer and screws down on the outside of a collar mounting or retainer which is molded around the body of the sprayer. When the overcap is screwed down on this collar mounting a seal is formed by the engagement of a circular ridge or rib located above the threads on the collar mounting with a mating shoulder located inside the overcap above its threads. 15 The overcap, as it is screwed down, depresses the pump plunger rendering the pump inoperable and when the seal is effected, any liquid which might seep into the overcap through or around the pump is prevented from leaking out of the overcap. The overcap serves also to protect the sprayer head and prevent damage to it during shipment or merchandising. When the overcap is in place it does not reach the cap of the container or bottle and in no way engages it since a slight space is left between those two pieces.

The device, called a shipper-sprayer in the industry, is sold as an integrated unit with the overcap in place enabling the insecticide manufacturer to install it on the container or bottle of liquid in a single operation in an automated bottling process. The ultimate consumer simply unscrews and discards the overcap, the pump plunger springs up and the sprayer is ready for use.

The Background of the Patent.

For many years manufacturers engaged in the insecticide business had faced a serious problem in developing sprayers that could be integrated with the containers or bottles in which the insecticides were marketed. Originally, insecticides were applied through the use of tin [383 U.S. 1, 28] sprayers, not supplied by the manufacturer. In 1947, Cook Chemical, an insecticide manufacturer, began to furnish its customers with plastic pump dispensers purchased from Calmar. The dispenser was an unpatented finger-operated device mounted in a perforated cardboard holder and hung over the neck of the bottle or container. It was necessary for the ultimate consumer to remove the cap of the container and insert and attach the sprayer to the latter for use.

Hanging the sprayer on the side of the container or bottle was both expensive and troublesome. Packaging for shipment had to be a hand operation, and breakage and pilferage as well as the loss of the sprayer during shipment and retail display often occurred. Cook Chemical urged Calmar to develop an integrated sprayer that could be mounted directly in a container or bottle during the automated filling process and that would not leak during shipment or retail handling. Calmar did develop some such devices but for various reasons they were not completely successful. The situation was aggravated in 1954 by the entry of Colgate-Palmolive into the insecticide trade with its product marketed in aerosol spray cans. These containers, which used compressed gas as a propellant to dispense the liquid, did not require pump sprayers.

During the same year Calmar was acquired by the Drackett Company. Cook Chemical became apprehensive of

its source of supply for pump sprayers and decided to manufacture its own through a subsidiary, Bakan Plastics, Inc. Initially, it copied its design from the unpatented Calmar sprayer, but an officer of Cook Chemical, Scoggin, was assigned to develop a more efficient device. By 1956 Scoggin had perfected the shipper-sprayer in suit and a patent was granted in 1959 to Cook Chemical as his assignee. In the interim Cook Chemical began to use Scoggin's device and also marketed [383 U.S. 1, 29] it to the trade. The device was well received and soon became widely used.

In the meanwhile, Calmar employed two engineers, Corsette and Coopridge, to perfect a shipper-sprayer and by 1958 it began to market its SS-40, a device very much similar to Scoggin's. When the Scoggin patent issued, Cook Chemical charged Calmar's SS-40 with infringement and this suit followed.

The Opinions of the District Court and the Court of Appeals.

At the outset it is well to point up that the parties have always disagreed as to the scope and definition of the invention claimed in the patent in suit. Cook Chemical contends that the invention encompasses a unique combination of admittedly old elements and that patentability is found in the result produced. Its expert testified that the invention was "the first commercially successful, inexpensive integrated shipping closure pump unit which permitted automated assembly with a container of household insecticide or similar liquids to produce a practical, ready-to-use package which could be shipped without external leakage and which was so organized that the pump unit with its hold-down cap could be itself assembled and sealed and then later assembled and sealed on the container without breaking the first seal." Cook Chemical stresses the long-felt need in the industry for such a device; the inability of others to produce it; and its commercial success - all of which, contends Cook, evidences the nonobvious nature of the device at the time it was developed. On the other hand, Calmar says that the differences between Scoggin's shipper-sprayer and the prior art relate only to the design of the overcap and that the differences are so inconsequential that the device as a whole would have been obvious at the time of its invention to a person having ordinary skill in the art. [383 U.S. 1, 30]

Both courts accepted Cook Chemical's contentions. While the exact basis of the District Court's holding is uncertain, the court did find the subject matter of the patent new, useful and nonobvious. It concluded that Scoggin "had produced a sealed and protected sprayer unit which the manufacturer need only screw onto the top of its container in much the same fashion as a simple metal cap." 220 F. Supp., at 418. Its decision seems to be bottomed on the finding that the Scoggin sprayer solved the long-standing problem that had confronted the industry. 16 The Court of Appeals also found validity in the "novel 'marriage' of the sprayer with the insecticide container" which took years in discovery and in "the immediate commercial success" which it enjoyed. While finding that the individual elements of the invention were "not novel per se" the court found "nothing in the prior art suggesting Scoggin's unique combination of these old features . . . as would solve the . . . problems which for years beset the insecticide industry." It concluded that "the . . . [device] meets the exacting standard required for a combination of old elements to rise to the level of patentable invention by fulfilling the long-felt need with an economical, efficient, utilitarian apparatus which achieved novel results and immediate commercial success." 336 F.2d, at 114.

The Prior Art.

Only two of the five prior art patents cited by the Patent Office Examiner in the prosecution of Scoggin's application are necessary to our discussion, i. e., Lohse [383 U.S. 1, 31] U.S. Patent No. 2,119,884 (1938) and Mellon U.S. Patent No. 2,586,687 (1952). Others are cited by Calmar that were not before the Examiner, but of these our purposes require discussion of only the Livingstone U.S. Patent No. 2,715,480 (1953). Simplified drawings of each of these patents are reproduced in the Appendix, Figs. 4-6, for comparison and description.

The Lohse patent (Fig. 4) is a shipper-sprayer designed to perform the same function as Scoggin's device. The differences, recognized by the District Court, are found in the overcap seal which in Lohse is formed by the skirt of the overcap engaging a washer or gasket which rests upon the upper surface of the container cap. The court emphasized that in Lohse "[t]here are no seals above the threads and below the sprayer head." 220 F. Supp., at 419.

The Mellon patent (Fig. 5), however, discloses the idea of effecting a seal above the threads of the overcap. Mellon's device, likewise a shipper-sprayer, differs from Scoggin's in that its overcap screws directly on the container, and a gasket, rather than a rib, is used to effect the seal.

Finally, Livingstone (Fig. 6) shows a seal above the threads accomplished without the use of a gasket or washer. 17 Although Livingstone's arrangement was designed to cover and protect pouring spouts, his sealing feature is strikingly similar to Scoggin's. Livingstone uses a tongue and groove technique in which the tongue, located on the upper surface of the collar, fits into a groove on the inside of the overcap. Scoggin employed the rib and shoulder seal in the identical position and with less efficiency because the Livingstone technique [383 U.S. 1, 32] is inherently a more stable structure, forming an interlock that withstands distortion of the overcap when subjected to rough handling. Indeed, Cook Chemical has now incorporated the Livingstone closure into its own shipper-sprayers as had Calmar in its SS-40.

The Invalidity of the Patent.

Let us first return to the fundamental disagreement between the parties. Cook Chemical, as we noted at the outset, urges that the invention must be viewed as the overall combination, or - putting it in the language of the statute - that we must consider the subject matter sought to be patented taken as a whole. With this position, taken in the abstract, there is, of course, no quibble. But the history of the prosecution of the Scoggin application in the Patent Office reveals a substantial divergence in respondent's present position.

As originally submitted, the Scoggin application contained 15 claims which in very broad terms claimed the entire combination of spray pump and overcap. No mention of, or claim for, the sealing features was made. All 15 claims were rejected by the Examiner because (1) the applicant was vague and indefinite as to what the invention was, and (2) the claims were met by Lohse. Scoggin canceled these claims and submitted new ones. Upon a further series of rejections and new submissions, the Patent Office Examiner, after an office interview, at last relented. It is crystal clear that after the first rejection, Scoggin relied entirely upon the sealing arrangement as the exclusive patentable difference in his combination. It is likewise clear that it was on that feature that the Examiner allowed the claims. In fact, in a letter accompanying the final submission of claims, Scoggin, through his attorney, stated that "agreement was reached between the Honorable Examiner and applicant's attorney relative to limitations which must be in the claims in [383 U.S. 1, 33] order to define novelty over the previously applied disclosure of Lohse when considered in view of the newly cited patents of Mellon and Darley, Jr." (Italics added.)

Moreover, those limitations were specifically spelled out as (1) the use of a rib seal and (2) an overcap whose lower edge did not contact the container cap. Mellon was distinguished, as was the Darley patent, *infra*, n. 18, on the basis that although it disclosed a hold-down cap with a seal located above the threads, it did not disclose a rib seal disposed in such position as to cause the lower peripheral edge of the overcap "to be maintained out of contacting relationship with [the container] cap . . . when . . . [the overcap] was screwed [on] tightly . . ." Scoggin maintained that the "obvious modification" of Lohse in view of Mellon would be merely to place the Lohse gasket above the threads with the lower edge of the overcap remaining in tight contact with the container cap or neck of the container itself. In other words, the Scoggin invention was limited to the use of a rib - rather than a washer or gasket - and the existence of a slight space between the overcap and the container cap.

It is, of course, well settled that an invention is construed not only in the light of the claims, but also with reference to the file wrapper or prosecution history in the Patent Office. *Hogg v. Emerson*, 11 How. 587 (1850); *Crawford v. Heysinger*, 123 U.S. 589 (1887). Claims as allowed must be read and interpreted with reference to rejected ones and to the state of the prior art; and claims that have been narrowed in order to obtain the issuance of a patent by distinguishing the prior art cannot be sustained to cover that which was previously by limitation eliminated from the patent. *Powers-Kennedy Co. v. Concrete Co.*, 282 U.S. 175, 185 -186 (1930); *Schriber Co. v. Cleveland Trust Co.*, 311 U.S. 211, 220 -221 (1940). [383 U.S. 1, 34]

Here, the patentee obtained his patent only by accepting the limitations imposed by the Examiner. The claims were carefully drafted to reflect these limitations and Cook Chemical is not now free to assert a broader view of Scoggin's invention. The subject matter as a whole reduces, then, to the distinguishing features clearly incorporated into the claims. We now turn to those features.

As to the space between the skirt of the overcap and the container cap, the District Court found:

"Certainly without a space so described, there could be no inner seal within the cap, but such a space is not new or novel, but it is necessary to the formation of the seal within the hold-down cap.

"To me this language is descriptive of an element of the patent but not a part of the invention. It is too simple, really, to require much discussion. In this device the hold-down cap was intended to perform two functions - to hold down the sprayer head and to form a solid tight seal between the shoulder and the collar below. In assembling the element it is necessary to provide this space in order to form the seal." 220 F. Supp., at 420. (Italics added.)

The court correctly viewed the significance of that feature. We are at a loss to explain the Examiner's allowance on the basis of such a distinction. Scoggin was able to convince the Examiner that Mellon's cap contacted the bottle neck while his did not. Although the drawings included in the Mellon application show that the cap might touch the neck of the bottle when fully screwed down, there is nothing - absolutely nothing - which indicates that the cap was designed at any time to engage the bottle neck. It is palpably evident that Mellon embodies a seal formed by a gasket compressed [383 U.S. 1, 35] between the cap and the bottle neck. It follows that the cap in Mellon will not seal if it does not bear down on the gasket and this would be impractical, if not impossible, under the construction urged by Scoggin before the Examiner. Moreover, the space so strongly asserted by Cook Chemical appears quite plainly on the Livingstone device, a reference not cited by the Examiner.

The substitution of a rib built into a collar likewise presents no patentable difference above the prior art. It was fully disclosed and dedicated to the public in the Livingstone patent. Cook Chemical argues, however, that Livingstone is not in the pertinent prior art because it relates to liquid containers having pouring spouts rather than pump sprayers. Apart from the fact that respondent made no such objection to similar references cited by

the Examiner, 18 so restricted a view of the applicable prior art is not justified. The problems confronting Scoggin and the insecticide industry were not insecticide problems; they were mechanical closure problems. Closure devices in such a closely related art as pouring spouts for liquid containers are at the very least pertinent references. See, *II Walker on Patents* 260 (Deller ed. 1937).

Cook Chemical insists, however, that the development of a workable shipper-sprayer eluded Calmar, who had long and unsuccessfully sought to solve the problem. And, further, that the long-felt need in the industry for a device such as Scoggin's together with its wide commercial success supports its patentability. These legal inferences [383 U.S. 1, 36] or subtests do focus attention on economic and motivational rather than technical issues and are, therefore, more susceptible of judicial treatment than are the highly technical facts often present in patent litigation. See *Judge Learned Hand in Reiner v. I. Leon Co.*, 285 F.2d 501, 504 (1960). See also Note, *Subtests of "Nonobviousness": A Nontechnical Approach to Patent Validity*, 112 U. Pa. L. Rev. 1169 (1964). Such inquiries may lend a helping hand to the judiciary which, as Mr. Justice Frankfurter observed, is most ill-fitted to discharge the technological duties cast upon it by patent legislation. *Marconi Wireless Co. v. United States*, 320 U.S. 1, 60 (1943). They may also serve to "guard against slipping into use of hindsight," *Monroe Auto Equipment Co. v. Heckethorn Mfg. & Sup. Co.*, 332 F.2d 406, 412 (1964), and to resist the temptation to read into the prior art the teachings of the invention in issue.

However, these factors do not, in the circumstances of this case, tip the scales of patentability. The Scoggin invention, as limited by the Patent Office and accepted by Scoggin, rests upon exceedingly small and quite nontechnical mechanical differences in a device which was old in the art. At the latest, those differences were rendered apparent in 1953 by the appearance of the Livingstone patent, and unsuccessful attempts to reach a solution to the problems confronting Scoggin made before that time became wholly irrelevant. It is also irrelevant that no one apparently chose to avail himself of knowledge stored in the Patent Office and readily available by the simple expedient of conducting a patent search - a prudent and nowadays common preliminary to well organized research. *Mast, Foos & Co. v. Stover Mfg. Co.*, 177 U.S. 485 (1900). To us, the limited claims of the Scoggin patent are clearly evident from the prior art as it stood at the time of the invention. [383 U.S. 1, 37]

We conclude that the claims in issue in the Scoggin patent must fall as not meeting the test of 103, since the differences between them and the pertinent prior art would have been obvious to a person reasonably skilled in that art.

The judgment of the Court of Appeals in No. 11 is affirmed. The judgment of the Court of Appeals in Nos. 37 and 43 is reversed and the cases remanded to the District Court for disposition not inconsistent with this opinion.

It is so ordered.

MR. JUSTICE STEWART took no part in the consideration or decision of Nos. 37 and 43.

MR. JUSTICE FORTAS took no part in the consideration or decision of these cases. [383 U.S. 1, 38]

Footnotes

[Footnote 1] The provision appears in the Constitution spliced together with the copyright provision, which we omit as not relevant here. See H. R. Rep. No. 1923, 82d Cong., 2d Sess., at 4 (1952); DeWolf, *An Outline of Copyright Law*, p. 15 (Boston, 1925).

[Footnote 2] "Stable ownership is the gift of social law, and is given late in the progress of society. It would be curious then, if an idea, the fugitive fermentation of an individual brain, could, of natural right, be claimed in exclusive and stable property. If nature has made any one thing less susceptible than all others of exclusive property, it is the action of the thinking power called an idea, which an individual may exclusively possess as long as he keeps it to himself; but the moment it is divulged, it forces itself into the possession of every one, and the receiver cannot dispossess himself of it. Its peculiar character, too, is that no one possesses the less, because every other possesses [383 U.S. 1, 9] the whole of it. He who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me. That ideas should freely spread from one to another over the globe, for the moral and mutual instruction of man, and improvement of his condition, seems to have been peculiarly and benevolently designed by nature, when she made them, like fire, expansible over all space, without lessening their density in any point, and like the air in which we breathe, move, and have our physical being, incapable of confinement or exclusive appropriation. Inventions then cannot, in nature, be a subject of property. Society may give an exclusive right to the profits arising from them, as an encouragement to men to pursue ideas which may produce utility, but this may or may not be done, according to the will and convenience of the society, without claim or complaint from any body." VI *Writings of Thomas Jefferson*, at 180-181 (Washington ed.).

[Footnote 3] "[A] machine of which we are possessed, might be applied by every man to any use of which it is susceptible." Letter to Isaac McPherson, *supra*, at 181. "[A] change of material should not give title to a patent. As the making a ploughshare of cast rather than of wrought iron; a comb of iron instead of horn or of ivory" *Ibid*. "[A] mere change of form should give no right to a patent, as a high-quartered shoe instead of a low one; a round

hat instead of a three-square; or a square bucket instead of a round one." *Id.*, at 181-182. "[A combined use of old implements.] A man has a right to use a saw, an axe, a plane separately; may he not combine their uses on the same piece of wood?" Letter to Oliver Evans (Jan. 1814), VI Writings of Thomas Jefferson, at 298 (Washington ed.).

[Footnote 4] In historical retrospect, the specific result in *Hotchkiss* flows directly from an application of one of the rules of the original board of "Commissioners," n. 3, second rule, *supra*.

[Footnote 5] " 101. Inventions patentable "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." " 102. Conditions for patentability; novelty and loss of right to patent "A person shall be entitled to a patent unless - "(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or "(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in [383 U.S. 1, 13] this country, more than one year prior to the date of the application for patent in the United States, or "(c) he has abandoned the invention, or "(d) the invention was first patented or caused to be patented by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application filed more than twelve months before the filing of the application in the United States, or "(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or "(f) he did not himself invent the subject matter sought to be patented, or "(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other." The precursors of these sections are to be found in the Act of February 21, 1793, c. 11, 1 Stat. 318; Act of July 4, 1836, c. 357, 5 Stat. 117; Act of July 8, 1870, c. 230, 16 Stat. 198; Rev. Stat. 4886 (1874).

[Footnote 6] The corresponding provision in the preliminary draft was titled "Conditions for patentability, lack of invention" (*italics added*), Proposed Revision and Amendment of the Patent Laws, Preliminary Draft with Notes, House Committee on the Judiciary (Committee Print, 1950).

[Footnote 7] The sentence in which the phrase occurs reads: "[T]he new device, however useful it may be, must reveal the flash of creative genius, not merely the skill of the calling." At p. 91. Although some writers and lower courts found in the language connotations as to the frame of mind of the inventors, none were so intended. The opinion approved *Hotchkiss* specifically, and the reference to "flash of creative genius" was but a rhetorical embellishment of language going back to 1833. Cf. "exercise of genius," *Shaw v. Cooper*, 7 Pet. 292; "inventive genius," *Reckendorfer v. Faber*, 92 U.S. 347 (1876); *Concrete Appliances Co. v. Gomery*, 269 U.S. 177; "flash of thought," *Densmore v. Scofield*, 102 U.S. 375 (1880); "intuitive genius," *Potts v. Creager*, 155 U.S. 597 (1895). Rather than establishing a more exacting standard, *Cuno* merely rhetorically restated the requirement that the subject matter sought to be patented must be beyond the skill of the calling. It was the device, not [383 U.S. 1, 16] the invention, that had to reveal the "flash of creative genius." See Boyajian, *The Flash of Creative Genius, An Alternative Interpretation*, 25 J. Pat. Off. Soc. 776, 780, 781 (1943); *Pacific Contact Laboratories, Inc. v. Solex Laboratories, Inc.*, 209 F.2d 529, 533; *Brown & Sharpe Mfg. Co. v. Kar Engineering Co.*, 154 F.2d 48, 51-52; *In re Shortell*, 31 C. C. P. A. (Pat.) 1062, 1069, 142 F.2d 292, 295-296.

[Footnote 8] "There is no provision corresponding to the first sentence explicitly stated in the present statutes, but the refusal of patents by the Patent Office, and the holding of patents invalid by the courts, on the ground of lack of invention or lack of patentable novelty has been followed since at least as early as 1850. This paragraph is added with the view that an explicit statement in the statute may have some stabilizing effect, and also to serve as a basis for the addition at a later time of some criteria which may be worked out. "The second sentence states that patentability as to this requirement is not to be negated by the manner in which the invention was made, that is, it is immaterial whether it resulted from long toil and experimentation or from a flash of genius."

[Footnote 9] See *Efforts to Establish a Statutory Standard of Invention*, Study No. 7, Senate Subcommittee on Patents, Trademarks, and Copyrights, 85th Cong., 1st Sess. (Committee Print, 1958); *Hearings, Subcommittee No. 3, House Committee on the Judiciary, on H. R. 3760*, 82d Cong., 1st Sess. (1951).

[Footnote 10] The President has appointed a Commission on the Patent System. Executive Order No. 11215, 30 Fed. Reg. 4661 (April 10, 1965). It is hoped that its studies may develop more efficient administrative procedures and techniques that will further expedite dispositions and at the same time insure the strict application of appropriate tests of patentability.

[Footnote 11] In '811, where the shank was above the hinge plate, an upward movement of the chisel forced the shank up against the underside of the rear of the upper plate. The upper plate thus provided the fulcrum about which the hinge was pried open. Because of this, as well as the location of the hinge pin, the shank rubbed against the heel of the upper plate causing wear both to the plate and to the shank. By relocating the hinge pin and by placing the hinge plate between the shank and the upper plate, as in '798, the rubbing was eliminated and

the wear point was changed to the hinge plate, a member more easily removed or replaced for repair.

[Footnote 12] Even petitioners' expert testified to that effect: "Q. Given the same length of the forward portion of the clamp . . . you would anticipate that the magnitude of flex [in '798] would be precisely the same or substantially the same as in 811, wouldn't you?" "A. I would think so."

[Footnote 13] "Q. . . . Do you regard the small degree of flex in the forward end of the shank that lies between the pivot point and the point of spring attachment to be of any significance or any importance to the functioning of a device such as 798? A. Unless you are approaching the elastic limit, I think this flexing will reduce the maximum stress at the point of pivot there, where the maximum stress does occur. I think it will reduce that. I don't know how much. "Q. Do you think it is a substantial factor, a factor of importance in the functioning of the structure? A. Not a great factor, no." The same expert previously testified similarly in *Jeoffroy Mfg., Inc. v. Graham*, 219 F.2d 511.

[Footnote 14] The patent is U.S. No. 2,870,943 issued in 1959 to Cook Chemical Co. as assignee of Baxter I. Scoggin, Jr., the inventor. In No. 37, Calmar is the manufacturer of an alleged infringing device, and, in No. 43, Colgate is a customer of Calmar and user of its device.

[Footnote 15] Our discussion here relates to the overcap seal. The container itself is sealed in the customary way through the use of a container gasket located between the container and the container cap.

[Footnote 16] "By the same reasoning, may it not also be said that if [the device] solved a long-sought need, it was likewise novel? If it meets the requirements of being new, novel and useful, it was the subject of invention, although it may have been a short step, nevertheless it was the last step that ended the journey. The last step is the one that wins and he who takes it when others could not, is entitled to patent protection." 220 F. Supp., at 421.

[Footnote 17] While the sealing feature was not specifically claimed in the Livingstone patent, it was disclosed in the drawings and specifications. Under long-settled law the feature became public property. *Miller v. Brass Co.*, 104 U.S. 350, 352 (1882).

[Footnote 18] In addition to Livingstone and Mellon, the Examiner cited Slade, U.S. Patent No. 2,844,290 (hold-down cap for detergent cans having a pouring spout); Nilson, U.S. Patent No. 2,118,222 (combined cap and spout for liquid dispensing containers); Darley, Jr., U.S. Patent No. 1,447,712 (containers for toothpaste, cold creams and other semi-liquid substances). [383 U.S. 1, 39]

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In re Gordon et al. (CA FC) 221 USPQ 1125 (5/10/1984)

In re Gordon et al.

U.S. Court of Appeals Federal Circuit
221 USPQ 1125

Decided May 10, 1984
No. 83-1281

Headnotes

PATENTS

I. Patentability/Validity -- Obviousness -- References and claims as whole (§ 115.0904)

Question is not whether patentable distinction is created by viewing prior art apparatus from one direction and claimed apparatus from another, but whether it would have been obvious from fair reading of prior art reference as whole to turn prior art apparatus upside down: mere fact that prior art could be modified by turning apparatus upside down does not make modification obvious unless prior art suggested desirability of modification.

Particular patents -- Blood Filters

Gordon and Sutherland, Blood Filter Assembly, Rejection of claims 1-3 and 5-7 reversed.

Case History and Disposition:

Page 1126

Application for patent of Lucas S. Gordon and Karl M. Sutherland, Serial No. 124,312, filed Feb. 25, 1980. From decision rejecting claims 1-3 and 5-7, applicants appeal. Reversed.

Attorneys:

James W. Geriak, Los Angeles, Calif. (Bradford J. Duft, Los Angeles, Calif., on the brief) for appellants.

John F. Pitrelli (Joseph F. Nakamura and John W. Dewhurst, on the brief) for Patent and Trademark Office.

Judge:

Before Bennett and Miller, Circuit Judges and Skelton, Senior Circuit Judge.

Opinion Text

Opinion By:

Miller, Circuit Judge.

This appeal is from the decision of the United States Patent and Trademark Office ("PTO") Board of Appeals ("board") affirming the examiner's rejection of appellants' claims 1 1-3 and 5-7 as unpatentable under 35 U.S.C. §103. We reverse.

The Invention

Appellants claim a "blood filter assembly" used during surgery and other medical procedures involving the handling of blood to remove clots, bone debris, tissue, or other foreign materials from blood before it is returned to a patient's body. Unlike blood filter assemblies widely used in the prior art, the device of the present invention permits both entry of the blood into, and ultimate discharge of the blood out of, the *bottom* end of the filter assembly, as shown below. 2

Tabular, graphic, or textual material set at this point is not available. Please consult hard copy or call BNA PLUS at 1-800-452-7773 or 202-452-4323.

The blood filter assembly comprises a shell 1 provided with blood inlet 3 and blood outlet 4. Between the blood inlet and the blood outlet is filter medium 6 positioned within the filter medium core 7.

The location of blood inlet 3 is such that the incoming blood is directed along a spirally upward path by the inner wall of the shell. Further, the location of the blood inlet at the bottom end of the filter assembly facilitates the removal of gas bubbles by allowing them to rise upwardly out of the blood. The gas bubbles so removed are released from the blood filter assembly by means of a gas vent 5 located in the region of the top end of the assembly.

Independent claim 1, from which the other appealed claims depend, is illustrative:

Blood filter assembly comprising:

- a. a shell having a first top end and a second bottom end,
- b. a blood inlet located in the region of said bottom end and opening into said bottom end,
- c. a blood outlet located in the region of said bottom end,
- d. a gas vent located in the region of said top end, and
- e. a blood filter medium located between said blood inlet and said blood outlet,

said blood inlet being located and configured in a manner capable of directing incoming blood in a generally spiral path within said shell.

Claims 2, 3, and 5-7 further define the shape of the shell, the shape of the filter medium, and the nature of the material used as the filter medium.

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Prior Art

The sole reference relied upon by the board is United States Patent No. 1,175,948, issued March 21, 1916, to French. French discloses a liquid strainer for removing dirt and water from gasoline and other light oils. As shown below, the inlet 4 and outlet 5 of the French device are both at the *top* end of the device.

Tabular, graphic, or textual material set at this point is not available. Please consult hard copy or call BNA PLUS at 1-800-452-7773 or 202-452-4323.

A continuous helical tooth or thread 8 is formed integral with the inner wall of shell 1 and imparts to the incoming liquid a whirling motion, which gives the liquid a scouring action to help clean the surface of a metal screen filter 21 and guides unwanted dirt and water downwardly into a pocket 9 in the bottom of the shell. A pair of shelves 10 and 11, projecting inwardly and downwardly from the inner wall of the shell, further assists the entrance of dirt and water into the pocket 9 and prevents their being drawn back into the main chamber 12. The reference expressly states, "gravity assists in the separation of heavier oils or water." A pet-cock 13, projecting vertically downward from the bottom of the pocket is used to remove the collected dirt and water periodically. The top of the liquid strainer is completely closed by gland 3 except for the inlet and outlet openings.

Board Opinion

The board held that the appealed claims were drawn to an apparatus which "would have at least been rendered prima facie obvious to one of ordinary skill in the art by the apparatus disclosed in French." The board's reasoning was that it would have been obvious to turn the French device upside down to have both the inlet and outlet at the bottom, rather than at the top; and to employ French's "pet-cock" as the claimed "gas vent." In the board's opinion, no patentable distinction was created by viewing French's apparatus from one direction and the claimed apparatus from another.

ANALYSIS

[1] We are persuaded that the board erred in its conclusion of prima facie obviousness. The question is not whether a patentable distinction is created by viewing a prior art apparatus from one direction and a claimed apparatus from another, but, rather, whether it would have been obvious from a fair reading of the prior art reference as a whole to turn the prior art apparatus upside down. French teaches a liquid strainer which relies, at least in part, upon the assistance of gravity to separate undesired dirt and water from gasoline and other light oils. Therefore, it is not seen that French would have provided any motivation to one of ordinary skill in the art to employ the French apparatus in an upside down orientation. The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification. See *Carl Schenck, A.G. v. Nortron Corp.*, 713 F.2d 782, 787, 218 USPQ 698, 702 (Fed. Cir. 1983), and *In re Sernaker*, 702 F.2d 989, 995-96, 217 USPQ 1, 6-7 (Fed. Cir. 1983), both citing *In re Imperato*, 486 F.2d 585, 587, 179 USPQ 730, 732 (CCPA 1973).

Indeed, if the French apparatus were turned upside down, it would be rendered inoperable for its intended purpose. The gasoline to be filtered would be trapped in pocket 9, and the water French seeks to separate would flow freely out of the outlet 5. Further, unwanted dirt would build up in the space between the wall of shell 1 and screen 21, so that, in time, screen 21 would become clogged unless a drain valve, such as pet-cock 13, were re-introduced at the new "bottom" of the apparatus. See *In re Schulpen*, 390 F.2d 1009, 1013, 157 USPQ 52, 55 (CCPA 1968). In effect, French teaches away from the board's proposed modification.

Because the PTO has failed to establish a prima facie case of obviousness, the rejection of claims 1-3 and 5-7 as unpatentable under 35 U.S.C. § 103 must be *reversed*. 3

Reversed

Footnotes

Footnote 1. In application Serial No. 124,312, filed February 25, 1980, for a "Blood Filter."

Footnote 2. Extraneous numbers have been removed from this and the subsequent drawing for clarification.

Footnote 3. Because our holding that the PTO has failed to establish a prima facie case is dispositive, it is unnecessary to reach other arguments raised by appellants.

- End of Case -

ences themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

2143.01 Suggestion or Motivation To Modify the References [R-1]

THE PRIOR ART MUST SUGGEST THE DESIRABILITY OF THE CLAIMED INVENTION

"There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art." *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998) (The combination of the references taught every element of the claimed invention, however without a motivation to combine, a rejection based on a *prima facie* case of obvious was held improper.). The level of skill in the art cannot be relied upon to provide the suggestion to combine references. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999).

"In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed substitution, combination, or other modification." *In re Linter*, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be

solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Lee*, 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002) (discussing the importance of relying on objective evidence and making specific factual findings with respect to the motivation to combine references); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

In *In re Kotzab*, the claims were drawn to an injection molding method using a single temperature sensor to control a plurality of flow control valves. The primary reference disclosed a multizone device having multiple sensors, each of which controlled an associated flow control valve, and also taught that one system may be used to control a number of valves. The court found that there was insufficient evidence to show that one system was the same as one sensor. While the control of multiple valves by a single sensor rather than by multiple sensors was a "technologically simple concept," there was no finding "as to the specific understanding or principle within the knowledge of the skilled artisan" that would have provided the motivation to use a single sensor as the system to control more than one valve. 217 F.3d at 1371, 55 USPQ2d at 1318.

In *In re Fine*, the claims were directed to a system for detecting and measuring minute quantities on nitrogen compounds comprising a gas chromatograph, a converter which converts nitrogen compounds into nitric oxide by combustion, and a nitric oxide detector. The primary reference disclosed a system for monitoring sulfur compounds comprising a chromatograph, combustion means, and a detector, and the secondary reference taught nitric oxide detectors. The examiner and Board asserted that it would have been within the skill of the art to substitute one type of detector for another in the system of the primary reference, however the court found there was no support or explanation of this conclusion and reversed.

In *In re Jones*, the claimed invention was the 2-(2 α -aminoethoxy) ethanol salt of dicamba, a compound with herbicidal activity. The primary reference disclosed *inter alia* the substituted ammonium salts of dicamba as herbicides, however the reference did not specifically teach the claimed salt. Secondary refer-

ences teaching the amine portion of the salt were directed to shampoo additives and a byproduct of the production of morpholine. The court found there was no suggestion to combine these references to arrive at the claimed invention.

WHERE THE TEACHINGS OF THE PRIOR ART CONFLICT, THE EXAMINER MUST WEIGH THE SUGGESTIVE POWER OF EACH REFERENCE

The test for obviousness is what the combined teachings of the references would have suggested to one of ordinary skill in the art, and all teachings in the prior art must be considered to the extent that they are in analogous arts. Where the teachings of two or more prior art references conflict, the examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art, considering the degree to which one reference might accurately discredit another. *In re Young*, 927 F.2d 588, 18 USPQ2d 1089 (Fed. Cir. 1991) (Prior art patent to Carlisle disclosed controlling and minimizing bubble oscillation for chemical explosives used in marine seismic exploration by spacing seismic sources close enough to allow the bubbles to intersect before reaching their maximum radius so the secondary pressure pulse was reduced. An article published several years later by Knudsen opined that the Carlisle technique does not yield appreciable improvement in bubble oscillation suppression. However, the article did not test the Carlisle technique under comparable conditions because Knudsen did not use Carlisle's spacing or seismic source. Furthermore, where the Knudsen model most closely approximated the patent technique there was a 30% reduction of the secondary pressure pulse. On these facts, the court found that the Knudsen article would not have deterred one of ordinary skill in the art from using the Carlisle patent teachings.).

FACT THAT REFERENCES CAN BE COMBINED OR MODIFIED IS NOT SUFFICIENT TO ESTABLISH *PRIMA FACIE* OBVIOUSNESS

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680,

16 USPQ2d 1430 (Fed. Cir. 1990) (Claims were directed to an apparatus for producing an aerated cementitious composition by drawing air into the cementitious composition by driving the output pump at a capacity greater than the feed rate. The prior art reference taught that the feed means can be run at a variable speed, however the court found that this does not require that the output pump be run at the claimed speed so that air is drawn into the mixing chamber and is entrained in the ingredients during operation. Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." 916 F.2d at 682, 16 USPQ2d at 1432.). See also *In re Fritch*, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992) (flexible landscape edging device which is conformable to a ground surface of varying slope not suggested by combination of prior art references).

FACT THAT THE CLAIMED INVENTION IS WITHIN THE CAPABILITIES OF ONE OF ORDINARY SKILL IN THE ART IS NOT SUFFICIENT BY ITSELF TO ESTABLISH *PRIMA FACIE* OBVIOUSNESS

A statement that modifications of the prior art to meet the claimed invention would have been "well within the ordinary skill of the art" at the time the claimed invention was made "because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). See also *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1318 (Fed. Cir. 2000) (Court reversed obviousness rejection involving technologically simple concept because there was no finding as to the principle or specific understanding within the knowledge of a skilled artisan that would have motivated the skilled artisan to make the claimed invention); *AI-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999) (The level of skill in the art cannot be relied upon to provide the suggestion to combine references.).

THE PROPOSED MODIFICATION CANNOT RENDER THE PRIOR ART UNSATISFACTORY FOR ITS INTENDED PURPOSE

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984) (Claimed device was a blood filter assembly for use during medical procedures wherein both the inlet and outlet for the blood were located at the bottom end of the filter assembly, and wherein a gas vent was present at the top of the filter assembly. The prior art reference taught a liquid strainer for removing dirt and water from gasoline and other light oils wherein the inlet and outlet were at the top of the device, and wherein a pet-cock (stopcock) was located at the bottom of the device for periodically removing the collected dirt and water. The reference further taught that the separation is assisted by gravity. The Board concluded the claims were *prima facie* obvious, reasoning that it would have been obvious to turn the reference device upside down. The court reversed, finding that if the prior art device was turned upside down it would be inoperable for its intended purpose because the gasoline to be filtered would be trapped at the top, the water and heavier oils sought to be separated would flow out of the outlet instead of the purified gasoline, and the screen would become clogged.).

"Although statements limiting the function or capability of a prior art device require fair consideration, simplicity of the prior art is rarely a characteristic that weighs against obviousness of a more complicated device with added function." *In re Dance*, 160 F.3d 1339, 1344, 48 USPQ2d 1635, 1638 (Fed. Cir. 1998) (Court held that claimed catheter for removing obstruction in blood vessels would have been obvious in view of a first reference which taught all of the claimed elements except for a "means for recovering fluid and debris" in combination with a second reference describing a catheter including that means. The court agreed that the first reference, which stressed simplicity of structure and taught emulsification of the debris, did not teach away from the addition of a channel for the recovery of the debris.).

THE PROPOSED MODIFICATION CANNOT CHANGE THE PRINCIPLE OF OPERATION OF A REFERENCE

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959) (Claims were directed to an oil seal comprising a bore engaging portion with outwardly biased resilient spring fingers inserted in a resilient sealing member. The primary reference relied upon in a rejection based on a combination of references disclosed an oil seal wherein the bore engaging portion was reinforced by a cylindrical sheet metal casing. Patentee taught the device required rigidity for operation, whereas the claimed invention required resiliency. The court reversed the rejection holding the "suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate." 270 F.2d at 813, 123 USPQ at 352.).

2143.02 Reasonable Expectation of Success Is Required**OBVIOUSNESS REQUIRES ONLY A REASONABLE EXPECTATION OF SUCCESS**

The prior art can be modified or combined to reject claims as *prima facie* obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986) (Claims directed to a method of treating depression with amitriptyline (or nontoxic salts thereof) were rejected as *prima facie* obvious over prior art disclosures that amitriptyline is a compound known to possess psychotropic properties and that imipramine is a structurally similar psychotropic compound known to possess antidepressive properties, in view of prior art suggesting the aforementioned compounds would be expected to have similar activity because the structural difference between the compounds involves a known bioisosteric replacement and because a research paper comparing the pharmacological properties of these two compounds suggested clinical testing of amitriptyline as an antidepressant. The court

sustained the rejection, finding that the teachings of the prior art provide a sufficient basis for a reasonable expectation of success.); *Ex parte Blanc*, 13 USPQ2d 1383 (Bd. Pat. App. & Inter. 1989) (Claims were directed to a process of sterilizing a polyolefinic composition with high-energy radiation in the presence of a phenolic polyester antioxidant to inhibit discoloration or degradation of the polyolefin. Appellant argued that it is unpredictable whether a particular antioxidant will solve the problem of discoloration or degradation. However, the Board found that because the prior art taught that appellant's preferred antioxidant is very efficient and provides better results compared with other prior art antioxidants, there would have been a reasonable expectation of success.).

AT LEAST SOME DEGREE OF PREDICTABILITY IS REQUIRED; APPLICANTS MAY PRESENT EVIDENCE SHOWING THERE WAS NO REASONABLE EXPECTATION OF SUCCESS

Obviousness does not require absolute predictability, however, at least some degree of predictability is required. Evidence showing there was no reasonable expectation of success may support a conclusion of nonobviousness. *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976) (Claims directed to a method for the commercial scale production of polyesters in the presence of a solvent at superatmospheric pressure were rejected as obvious over a reference which taught the claimed method at atmospheric pressure in view of a reference which taught the claimed process except for the presence of a solvent. The court reversed, finding there was no reasonable expectation that a process combining the prior art steps could be successfully scaled up in view of unchallenged evidence showing that the prior art processes individually could not be commercially scaled up successfully.). See also *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d 1200, 1207-08, 18 USPQ2d 1016, 1022-23 (Fed. Cir.), *cert. denied*, 502 U.S. 856 (1991) (In the context of a biotechnology case, testimony supported the conclusion that the references did not show that there was a reasonable expectation of success.); *In re O'Farrell*, 853 F.2d 894, 903, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988) (The court held the claimed method would have been obvious

over the prior art relied upon because one reference contained a detailed enabling methodology, a suggestion to modify the prior art to produce the claimed invention, and evidence suggesting the modification would be successful.).

PREDICTABILITY IS DETERMINED AT THE TIME THE INVENTION WAS MADE

Whether an art is predictable or whether the proposed modification or combination of the prior art has a reasonable expectation of success is determined at the time the invention was made. *Ex parte Erlich*, 3 USPQ2d 1011 (Bd. Pat. App. & Inter. 1986) (Although an earlier case reversed a rejection because of unpredictability in the field of monoclonal antibodies, the court found "in this case at the time this invention was made, one of ordinary skill in the art would have been motivated to produce monoclonal antibodies specific for human fibroblast interferon using the method of [the prior art] with a reasonable expectation of success." 3 USPQ2d at 1016 (emphasis in original).).

2143.03 All Claim Limitations Must Be Taught or Suggested

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

INDEFINITE LIMITATIONS MUST BE CONSIDERED

A claim limitation which is considered indefinite cannot be disregarded. If a claim is subject to more than one interpretation, at least one of which would render the claim unpatentable over the prior art, the examiner should reject the claim as indefinite under 35 U.S.C. 112, second paragraph (see MPEP § 706.03(d)) and should reject the claim over the prior art based on the interpretation of the claim that ren-

King argues that the wide disparity in punishments for crimes involving crack cocaine and those involving powder cocaine violates the Constitution's guarantee of equal protection in that it has a discriminatory impact on black persons. King argues that crack cocaine is predominantly used by blacks, and that powder cocaine is predominantly used by whites.¹ Thus, he argues that blacks are punished much more severely for using cocaine than are whites.

The parties agree that the appropriate level of scrutiny is the rational basis test, since King has not alleged a discriminatory intent on the part of Congress. Thus, we apply the rational basis test.²

[1,2] To pass the rational basis test, the legislation must have a legitimate purpose, and it must have been reasonable for lawmakers to believe that the use of the challenged classification would promote that purpose. *Western & Southern Life Insurance Co. v. State Board of Equalization*, 451 U.S. 648, 668, 101 S.Ct. 2070, 2083, 68 L.Ed.2d 514 (1981). We readily conclude that the sentencing scheme in question withstands scrutiny under the rational basis standard. The fact that crack cocaine is more addictive, more dangerous, and can be sold in smaller quantities than powder cocaine is sufficient reason for Congress to provide harsher penalties for its possession. *United States v. Watson*, 953 F.2d 895, 898 (5th Cir.), cert. denied, ___ U.S. ___, 112 S.Ct. 1989, 118 L.Ed.2d 586

1. King has presented no evidence to support his claim, although he points to statistics utilized by the Minnesota Supreme Court in *Minnesota v. Russell*, 477 N.W.2d 886 (Minn.1991). In that case, the trial court found that in 1988, 96.6% of all persons charged with possession of cocaine base in Minnesota were black, and that 79.6% of persons charged with possession of powder cocaine were white. For the purposes of argument, we will assume that the statistical data gathered in Minnesota is similar to that which would be found in this circuit.

2. The other circuits that have addressed this issue have applied the rational basis test. See *United States v. Watson*, 953 F.2d 895, 898 (5th Cir.), cert. denied, ___ U.S. ___, 112 S.Ct. 1989, 939 F.2d 659, 664 (8th Cir.1991); *United States v. Thomas*, 900 F.2d 37, 39 (4th Cir.1990); *United States v. Cyrus*, 890 F.2d 1245, 1248 (D.C.Cir.

(1992). See also *United States v. House*, 939 F.2d 659, 664 (8th Cir.1991); *United States v. Thomas*, 900 F.2d 37, 39 (4th Cir.1990); *United States v. Cyrus*, 890 F.2d 1245, 1248 (D.C.Cir.1989).³

AFFIRMED.



In re John R. FRITCH.

No. 91-1318.

United States Court of Appeals,
Federal Circuit.

Aug. 11, 1992.

United State Patent and Trademark Office, Board of Patent Appeals and Interferences agreed with examiner's conclusion that claimed invention for landscape edging apparatus and method was invalid based on obviousness. Applicant appealed. The Court of Appeals, Edward S. Smith, Senior Circuit Judge, held that fact that prior art could be modified in manner suggested by examiner did not make modification obvious.

1989). See also *United States v. Solomon*, 848 F.2d 156, 157 (11th Cir.1988) (no heightened scrutiny of mandatory minimum sentence for possession of cocaine base with intent to distribute because § 841(b)(1) does not discriminate on the basis of a suspect classification or a fundamental right).

3. King also argues that the state and federal law enforcement agencies engaged in "de facto" sentencing, violating his right to due process. King contends that state criminal charges against him were dismissed in favor of prosecution in federal court, where the sentences for crimes involving crack cocaine are much harsher than in state court. King was charged with violations of both federal and state law. Because he could have been prosecuted in both state and federal court, we cannot conclude that his rights were violated because he was prosecuted only in federal rather than state court.

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ous unless prior art suggested desirability of modification.

Reversed.

1. Patents ¶32

In proceedings before Patent and Trademark Office, examiner bears burden of establishing prima facie case of obviousness based on upon prior art; patent applicant may then attack examiner's prima facie determination as improperly made out, or applicant may present objective evidence tending to support conclusion of nonobviousness. 35 U.S.C.A. § 103.

2. Patents ¶16.4, 16.7

Claimed invention for landscape edging apparatus and method was not invalid based on obviousness; mere fact that prior art could be modified in manner suggested by examiner did not make modification obvious unless prior art suggested desirability of modification. 35 U.S.C.A. § 103.

3. Patents ¶16(1)

It is impermissible to use claimed invention as instruction manual or "template" to piece together teachings of prior art so that claimed invention is rendered obvious and unpatentable. 35 U.S.C.A. § 103.

Charles L. Gholz, Oblon, Spivak, McClelland, Maier & Neustadt, Arlington, Va., argued, for appellant. John R. Fritch, Corpus Christi, Tex., was on the brief.

Jameson Lee, Associate Sol., Arlington, Va., argued, for appellee. With him on the brief was Fred E. McKelvey, Sol. Of counsel was Richard E. Schafer.

Before PLAGER, Circuit Judge, SMITH, Senior Circuit Judge, and RADER, Circuit Judge.

EDWARD S. SMITH, Senior Circuit Judge.

John R. Fritch (Fritch) appeals the 27 February 1991 decision of the Patent and

I. Serial No. 06/838,721.

Issue

The issue is whether the Board erred in affirming the Examiner's determination that the prior art references of Wilson and Hendrix rendered the subject matter of Fritch's independent claims 1, 13, 24, and 29 obvious to one of ordinary skill in the art.

Background

In his final rejection, the Examiner rejected claims 1-24 and 27-30 of Fritch's application as unpatentable for obviousness under 35 U.S.C. § 103. Fritch appealed the final rejection to the Board. The Board affirmed the rejection as to claims 1-24, 29 and 30, entered a new ground of rejection for claim 27, and reversed as to claim 28. The Board agreed with the Examiner that the teachings of the Wilson and Hendrix patents rendered the subject matter of independent claims 1, 13, 24, and 29 obvious to one of ordinary skill in the art. Fritch does not appeal the Board's disposition as to claims 27 and 28, and at oral argument withdrew the appeal as to claim 8. The claims remaining in this appeal are 1-7, 9-24, 29 and 30.

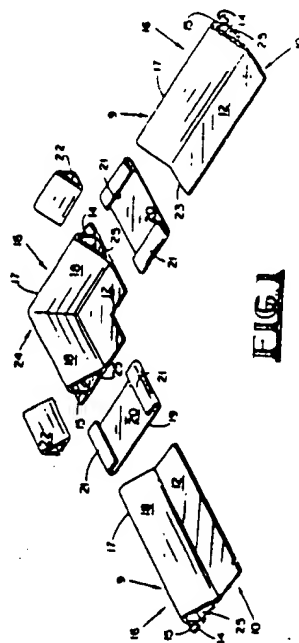
The Fritch Invention

The invention claimed by Fritch involves a landscape edging device which includes a planar base portion and an upwardly extending retainer portion. The base portion is elongate, thin, flexible and has a planar bottom surface conformable to a varying slope ground surface. One longitudinal

edge of the base portion serves as a mowing strip and the other serves as a retaining flange for landscape fill. The upwardly extending retainer portion is integrally connected (e.g., fused) to the base portion and defines a longitudinally extending enclosed space. The Fritch invention is intended to be used as a retainer for landscape fill in order to separate unmowable landscape fill from the mowable lawn. It may also be used to secure a landscaping sheet to the ground, or to function as guards at the base of a fence. Independent claims 1 and 13 on appeal are representative of the subject matter claimed:

1. A landscape edging strip formed in its entirety of a thin gauge, flexible material and conformable to a ground surface of varying slope, comprising a continuous elongate, thin gauge, flexible base portion having a planar bottom surface conformable to said varying slope ground surface; a thin gauge, elongate retainer portion integral with said base portion and extending upwardly therefrom and transversely thereover to overlie a portion of said base portion; all of said retainer portion defining a longitudinally extending enclosed space; said retainer portion being integrally connected to said base portion adjacent one longitudinal edge of said base portion to define a mowing strip adjacent the other longitudinal edge of said base portion.

The critical language in Fritch's independent claims is that the device is to be, in its entirety, both flexible and "conformable to a ground surface of varying slope". These limitations, although located in the claims' preambles, "are necessary to give meaning to the claim[s] and properly define the invention." Figure 1 from Fritch's drawings is reproduced below:



2. *Perkin Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 896, 221 USPQ 669, 675 (Fed.Cir. 1984).

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The Prior Art

a. The Wilson Patent

The Wilson patent relied upon by the Examiner and the Board is entitled "Grass Edging and Watering Device".³ The embodiment of the Wilson device includes a substantially flat mowing strip extending horizontally from a longitudinally extend-

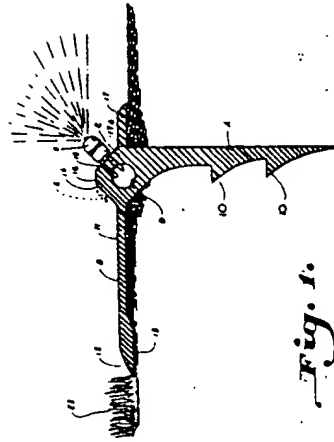


Fig. 1.

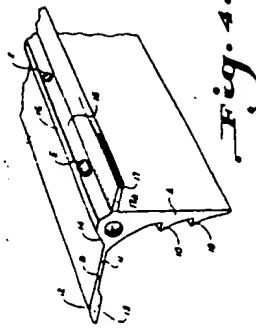


Fig. 4.

b. The Hendrix Patent

The Hendrix patent is entitled "Loose Material Retainer Strip".⁴ The Solicitor chose not to discuss the Hendrix reference in his brief, stating that the Board had deemed Hendrix unnecessary to its decision. The Solicitor overstates the Board's position. The Board based its decision upon "a collective evaluation of the Wilson and Hendrix patents". We include Hendrix in our discussion because it did play a role in the rejection of Fritch's independent claims.

The Hendrix device is composed of elongated, flexible strips having substantially C-shaped cross-section. The bottom lip of the device is to be wider than the top lip in order to facilitate fastening the device to the ground. The device will fit most gentle contours, and the top lip will yield laterally to build-up of gravel until the gravel can be redistributed. The concave portion of the strip is installed such that it faces the material to be retained in place. Hendrix contemplates that the retainer will be used

3. U.S. Patent No. 3,485,449.

4. U.S. Patent No. 4,349,596.

in retaining gravel in driveways, lining or concrete highways. Figure 1 of Hendrix's drawings is reproduced below:

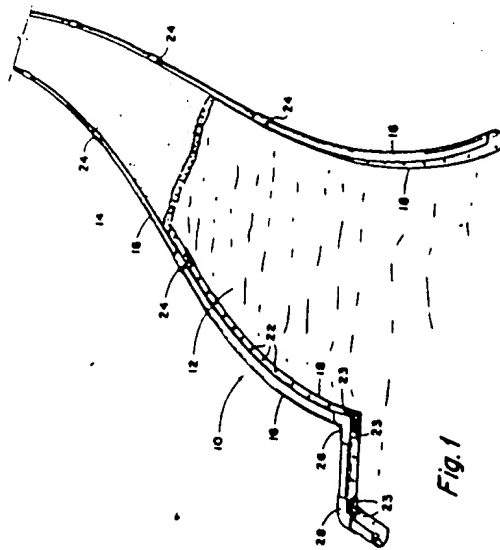


Fig. 1

Standard of Review

"[O]bviousness is a question of law to be determined from the facts."⁵ The obviousness determination "is based upon underlying factual inquiries concerning the claimed invention and the prior art" which are reviewed for clear error.⁶ However, it is the ultimate conclusion of obviousness which the Federal Circuit reviews as a matter of law.⁷

Teachings of Wilson

Fritch takes exception to the Examiner's findings of fact related to the teachings of the Wilson patent. The Examiner's rejection and the Board's opinion rely heavily on the use of Wilson in view of other references to declare the Fritch invention obvious. The Board states that it agrees with the Examiner's finding of fact regarding the

teachings of Wilson. In the Examiner's answer, which the Board quotes, the Wilson device is described as follows:

Wilson discloses a landscaping edging strip comprising a relatively thin gauge, elongated flexible base portion including a mower strip B having a planar bottom surface conformable to a varying slope surface.

The Board states that the Wilson reference presents "substantial evidence that Wilson is both thin and flexible." The Board regards the Wilson device as teaching that it is flexible and conformable in its entirety. This finding demonstrates clear error.

It is well settled that a prior art reference is relevant for all that it teaches to those of ordinary skill in the art.⁸ The base portion of Wilson is not planar in its

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entirety, as the Board's opinion suggests, but also includes a prominent anchoring leg to secure the device to the ground. The anchoring leg, which runs the length of the Wilson device, would inhibit longitudinal flexibility of the Wilson device. Indeed, Wilson expressly contemplates flexibility and conformability *only* in the mower strip. Wilson states that its mower strip may be lifted in order to pack dirt thereunder for the purpose of securing the device to the ground. Fritch, on the other hand, is claimed to be flexible in its entirety. The Board's holding that Wilson is flexible in its entirety is based upon a misapprehension of the scope of Wilson's teachings.

Second, Wilson's anchoring leg prohibits conformability to the ground surface in the manner claimed by Fritch. The Examiner's description of Wilson as having a "planar bottom surface conformable to a varying slope surface" is applicable *only* in reference to the mower strip. This description, however, ignores the anchor leg and the fact that it must be placed into the ground. Wilson expressly teaches that the anchoring leg may be pushed into soft soils, but in harder terrain a trench is needed in order to place the Wilson sprinkler system. In order to install the Wilson apparatus, the ground surface must be altered to conform to the device rather than, as the Solicitor contends, that Wilson is freely conformable to the ground. Fritch, on the other hand, does not require such extensive alteration of the ground surface in order to install the device.

Prima Facie Obviousness

[1] In proceedings before the Patent and Trademark Office, the Examiner bears the burden of establishing a prima facie case of obviousness based upon the prior art.⁹ "[The Examiner] can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in

the art would lead that individual to combine the relevant teachings of the references."¹⁰ The patent applicant may then attack the Examiner's prima facie determination as improperly made out, or the applicant may present objective evidence tending to support a conclusion of nonobviousness.¹¹

[2] Fritch has attacked the Board's finding that the Examiner established that Fritch's claimed invention was *prima facie* obvious in view of the teachings of the prior art. The Board states that "a collective evaluation of the Wilson and the Hendrix patents would have rendered the subject matter of independent claims 1, 13, 24, and 29 obvious to one of ordinary skill." Fritch maintains that there is no teaching, suggestion, or incentive in the prior art to modify or to combine the teachings of the prior art in the manner suggested by the Examiner. We agree.

Wilson teaches a grass edging and watering device which includes an anchoring leg for securing the device to the ground. Wilson contemplates that a trench will need to be dug in order to allow the anchoring leg to be placed into the ground if the condition of the soil requires it. This anchoring leg prohibits flexibility and conformability over the length of Wilson. Any flexibility or conformability in Wilson, which the Board states extends to the entire device, is limited to the mower strip. It is only the mower strip that is mentioned as being flexible in order to aid installation. Hendrix has been cited for its teaching of a flexible retainer strip that is able to conform to the ground surface.

Wilson addresses the problems of arresting growth of grass between areas and watering plants without wetting sidewalks. Wilson lacks any suggestion or incentive to use its water conduit as a landscape retainer since this would arguably result in clogged sprinkler heads.¹² Wilson also

11. *In re Haldi*, 433 F.2d 808, 811, 167 USPQ 676, 678 (CCPA 1970).

12. This court has previously found a proposed modification inappropriate for an obviousness inquiry when the modification rendered the prior art reference inoperable for its intended purpose.

9. *In re Plascaki*, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed.Cir.1984).

10. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed.Cir.1988) (citing *In re Latta*, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed.Cir. 1988)).

7. *In re De Blauwe*, 736 F.2d at 703, 222 USPQ at 195.

8. *Beckman Instruments Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1551, 13 USPQ2d 1301, 1304 (Fed.Cir.1990).

5. *In re De Blauwe*, 736 F.2d 699, 703, 222 USPQ 191, 195 (Fed.Cir.1984).

6. *In re Kulling*, 897 F.2d 1147, 1149, 14 USPQ2d 1056, 1057 (Fed.Cir.1990).

teaches that its mower strip is flexible in order to allow dirt to be packed thereunder. There is no suggestion in Wilson to extend that flexibility to the entire device. Wilson also lacks any teaching or suggestion that one should remove the anchoring leg. Hendrix does not, simply by virtue of its flexible nature, suggest these extensive changes which the Board states are obvious. Neither Wilson nor Hendrix, alone or in combination, provide any incentive to combine the teachings of the prior art in the manner maintained by the Board.

"Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under section 103, teachings of references can be combined *only* if there is some suggestion or incentive to do so." Although couched in terms of combining teachings found in the prior art, the same inquiry must be carried out in the context of a purported obvious "modification" of the prior art. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.¹⁴ Wilson and Hendrix fail to suggest any motivation for, or desirability of, the changes espoused by the Examiner and endorsed by the Board.

[3] Here, the Examiner relied upon hindsight to arrive at the determination of obviousness. It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious.¹⁵ This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the

pose. *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed.Cir.1984).

13. *ACS Hosp. Systems, Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir.1984).

14. *In re Gordon*, 733 F.2d at 902, 221 USPQ at 1127.

15. *In re Gorman*, 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed.Cir.1991). See also *Interconnect*

prior art to deprecate the claimed invention." ¹⁴

Conclusion

The decision of the Board affirming the Examiner's rejection of independent claims 1, 13, 24, and 29 of Fritch's application as unpatentable over the prior art under 35 U.S.C. § 103 is reversed. Since independent claims are nonobvious if the independent claims from which they depend are nonobvious, the Board's affirmation of the rejection of dependent claims 2-7, 9-12, 14-23, and 30 is also reversed.¹⁷

REVERSED.



THE UNITED STATES,
Plaintiff-Appellee,

v.

COMMODITIES EXPORT CO.,
Defendant-Appellant,

and

Old Republic Insurance Co.,
Defendant-Appellant.

Nos. 91-1470, 91-1482.

United States Court of Appeals,
Federal Circuit.

Aug. 11, 1992.

Government brought action to recover unpaid liquidated damages under customs warehouse bond. The United States Court *Planning Corp. v. Feil*, 774 F.2d 1132, 1138, 227 USPQ 543, 547 (Fed.Cir.1985).

16. *In re Fina*, 837 F.2d at 1075, 5 USPQ2d at 1600.

17. *In re Fina*, 837 F.2d at 1076, 5 USPQ2d at 1600 (citing *Harrison Int'l, Inc. v. Simplimatic Eng'g Co.*, 819 F.2d 1100, 1108, 2 USPQ2d 1826, 1831 (Fed.Cir.1987)). See also *In re Sernaker*, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed.Cir.1983) (when argued together, dependent claims stand or fall with the independent claims from which they depend).

Cite as 972 F.2d 1266 (Fed. Cir. 1992)

5. Limitation of Actions ¶43

Under federal law governing statutes of limitations, cause of action accrues when all events necessary to state claim occur.

6. Limitation of Actions ¶47(3)

Action brought by government to recover unpaid liquidated damages under customs warehouse bond was time barred under six-year limitations period for actions founded on contract; fact that Customs unilaterally adopted regulations which delayed filing of action until Customs had given notice and waited 60 days for response did not change accrual of limitations period. 28 U.S.C.A. §§ 2415, 2416, 2416(c).

Mark S. Sochaczewsky, Atty., Commercial Litigation Branch, Dept. of Justice, New York City, argued, for plaintiff-appellee. With him on the brief, were Stuart M. Gerson, Asst. Atty. Gen., David M. Cohen, Director and Joseph I. Liebman, Atty. in Charge, Intern. Trade Field Office. Also on the brief was Michele L. Kenney, U.S. Customs Service, of counsel.

Roger E. Craig, Naples, Fla., argued, for defendant-appellant, Commodities Export Co. With him on the brief, was Walter H. Lubienksi, Lubienksi & Lubienksi, Detroit, Mich. Wayne James Jarvis, Wayne Jarvis, Ltd., Chicago, Ill., argued, for defendant-appellant, Old Republic Ins. Co. With him on the brief was Michael G. Hodes, Hodes & Filon, Chicago, Ill., of counsel.

Before ARCHER, Circuit Judge, BENNETT, Senior Circuit Judge, and RADER, Circuit Judge.

RADER, Circuit Judge.

The United States sued Commodities Export Company and Old Republic Insurance Company in the United States Court of International Trade to recover unpaid liquidated damages under a customs warehouse bond. The trial court entered judgment in favor of the United States, *United States v. Commodities Export Co. & Old Republic Ins. Co.*, CIT No. 89-03-00144, May 14, 1991. Because the United States did not file its action within the six year statute of

1. Customs Duties ¶84(1)

In order to fall within exclusive jurisdiction of Court of International Trade, action to recover on bond must be begun by United States, must arise out of import transaction, and must relate to importation of merchandise required by laws of United States or by Secretary of Treasury.

2. Customs Duties ¶84(1)

For purposes of determining whether action to recover on bond falls within exclusive jurisdiction of Court of International Trade, foreign goods in bonded warehouse are "imported" on entry into United States. 28 U.S.C.A. §§ 1582, 1582(2).

3. Customs Duties ¶84(1)

For purposes of determining whether action to recover on bond falls within exclusive jurisdiction of Court of International Trade, bond related to importation of merchandise where it dealt with documentation and manipulation of imported merchandise in bonded warehouse and insured payment of duties on imported merchandise in event that duties became payable. 28 U.S.C.A. §§ 1582(2), 2415(a); Tariff Act of 1930, § 621, as amended, 19 U.S.C.A. § 1621.

4. Customs Duties ¶84(3)

Action to recover liquidated damages under terms of bond agreement was "founded upon a contract" and thus was subject to six-year limitation period and not five-year limitations period applicable to cases in which government sought pecuniary penalties accruing under customs law. 28 U.S.C.A. §§ 1582(2), 2415(a); Tariff Act of 1930, § 621, as amended, 19 U.S.C.A. § 1621.

work in same way, there is no patent anticompetition. 35 U.S.C.A. § 102(a).

5. *Patents* — 310(7)(4)

Allegation by alleged patent infringer of prior uses which were in fact found in somewhat similar but distinct situations did not provide sufficient basis upon which to negate novelty. 35 U.S.C.A. §§ 102, 102(a).

6. *Patents* — 168(1)

Claim that prior art placed before Patent Office in course of its review and approval was inadequate was not supported by file wrapper where, although application did not list every prior art device which contained some element found on marsh buggy for which patent was sought, application presented examiner with pertinent prior art, including relevant references to each element distinguishing buggy from earlier patented marsh craft. 35 U.S.C.A. § 102.

7. *Patents* — 98

Justification of prior art requirement includes notion of fair disclosure by applicants so that Patent Office may adequately consider previous inventions. 35 U.S.C.A. § 102.

8. *Patents* — 98

In context of prior art placed before Patent Office in course of its review, fair disclosure is not endless or absolute disclosure; it suffices if Patent Office is not misled and has meaningful opportunity to compare pertinent prior art. 35 U.S.C.A. § 102.

9. *Patents* — 26(1)(4, 2)

Lineup of evaluation of patent's obviousness was obvious at time of invention, but whether aggregation produced new or different result or achieved synergistic effect. 35 U.S.C.A. § 103.

10. *Patents* — 26(1)

In judging obviousness of combination patent, Court of Appeals would look to aggregate effect of individual components. 35 U.S.C.A. § 103.

11. *Patents* — 26(1)(4)

Combination patents, to be valid, must produce unexpected, unusual or synergistic result; inquiry is nothing more than whether or whole is greater than sum of its parts. 35 U.S.C.A. § 103.

12. *Patents* — 26(1)(4)

Notwithstanding that many elements of patented swamp buggy could be separately found in prior art, synergistic effect of combination, which resulted in first craft capable of traveling safely and carrying heavy loads for extended periods through stump-filled swamps, belied charge of obviousness. 35 U.S.C.A. § 103.

13. *Patents* — 1622

Where limitations of previously patented swamp vehicle, when tested outside its intended uses, were immediately apparent but no definitive improvement was offered for over 20 years, patent at issue for first craft capable of traveling safely and carrying heavy loads for extended periods through stump-filled swamps was innovatively different and not readily obvious to one in inventor's position and was therefore valid. 35 U.S.C.A. § 103.

14. *Patents* — 237

Doctrine of equivalents gives patentee broad protection from minor deviations.

15. *Patents* — 235(2)

Patent No. 3,842,785, for vehicle which could travel safely carrying heavy loads for extended periods through stump-filled swamps, was infringed by craft having substantial identity of means, operation and result and differences which were but cosmetic and trivial.

Greenberg & Dailam, Nathan Greenberg, Gretna, La., for defendants-appellants.

Keaty & Garry, Thomas S. Keaty, New Orleans, La., for plaintiffs-appellees.

Appeal from the United States District Court for the Eastern District of Louisiana.

Before TUTTLE*, POLITZ and GARWOOD, Circuit Judges.

POLITZ, Circuit Judge:

The discovery of oil and gas deposits beneath the marshes and swamps of the Gulf South opened vast vistas, offered many opportunities and called for a host of new developments. A form of transportation capable of traversing the neither-land-nor-water character of the wide-open treeless marshes, as well as the obstruction-ridden, stump-studded swamps, was an immediate and pressing need. In 1974, Huey J. Rivet offered a solution with an "Amphibious Marsh Craft" for hauling loads and laying pipeline in the swamp. The instant dispute involves Rivet's marsh patent, infringed, according to the plaintiffs, by the defendants' manufacture of similar craft. After bifurcation, the district court, 561 F.Supp. 512, found the Rivet patent valid and infringed by defendants' vehicle. We affirm.

Facts

The Rivet patent, U.S. Patent No. 3,842,785, describes an endless-track amphibious vehicle, resembling a pontooned army tank, capable of traversing marshes and swamp-land, carrying loads up to 60 tons over tree stumps and other obstacles. Rivet's buggy finds primary application in oil and gas related transportation and construction, offering an efficient method for laying pipelines through the Louisiana swamps.

Before the advent of the Rivet craft, those venturing into the swamps relied on a marsh craft patented in 1947 by Frank Reynolds. The Reynolds amphibian was originally used in seismic survey work in the open marshes. Its design was not suitable for hauling heavy loads or for movement through swampy areas. In the 1960s this craft was adapted for limited pipeline work by attachment of a small crane to a set of Reynolds-type pontoons. Other modifications included the addition of a backhoe and the reduction of the vehicle's size, both in an effort to avoid damage caused by tree stumps encountered in the swamps.*

* Circuit Judge of the Eleventh Circuit, sitting by

(per as 708 F.2d 151 (1983))

Despite the adaptations, the Reynolds buggy could not make the transition from treeless marshes to tree swamps, and it could not carry heavy loads without frequent mishaps. Pipeline workers sought to navigate the swamps by "mating," a procedure using huge timber mats to support earthmovers which cleared away the tree stumps. The process was slow, cumbersome and expensive. The mats had to be moved to each new location and, not infrequently, the equipment would slip off the mats and sustain damage. The name of the game was damages and delay. Even with this costly workover of the swamps, the Reynolds craft would break down often, making back-up units necessary to prevent expensive immobilization of construction crews.

Huey Rivet was using this burdensome process while laying pipeline in Mississippi and Louisiana in 1971. Frustration at the inefficiency and construction delays provided the motivation for his invention of a structurally stronger, more watertight buggy. Rivet developed a buggy capable of traversing stump-filled swamp-land, actually "walking" over stumps without matting or preclearing. The craft could do so for extended periods, carrying substantial loads. The design resisted the dual hanes of previous marsh buggies—pontoon puncturing and weld twisting.

The advantages enjoyed by the Rivet model derived principally from: (1) placement of plastic support blocks on the cleats to prevent pontoon puncturing, (2) spacing of I-beams on pontoon bottoms for support, and (3) creating discrete buoyant chambers by placing vertical bulkheads within the length of the pontoons.

Robert J. Wilson, Sr., father of defendants John M. Wilson, Sr., Dean R. Wilson, and Robert J. Wilson, Jr., worked for Rivet during 1974 as a contract welder. During this time, as found by the district court, Wilson received detailed instructions on the design of the Rivet pontoon. Upon completion of his welding contract with Rivet, Wilson began building Rivet-type pontoons designation.

for Wilco Marsh Briggies and Dracglines, Inc., a corporation formed and owned by his three sons. Wilco bought a Rivet craft and Dean Wilson ordered copies of the Rivet patent. Wilco began the production and sale of a marsh buggy strikingly similar to the Rivet vehicle, especially the model manufactured by Kori Corporation, a Rivet licensee.

Rivet, Kori, and another licensee, Louis Workben, filed the instant suit against Wilco and the Wilson brothers, seeking injunctive relief and damages. In the pre-trial bifurcation, the issue of damages, together with claims and counterclaims of unfair competition, libel and trade secret appropriation, was severed. After trial to the bench, the district court found the patent and infringed and enjoined further infringement.

Validity

Relying on the Reynolds patent, recent design improvements in the marsh craft industry, and patents from other fields, Wilco contends that the Rivet patent is invalid because: (1) it was anticipated in the prior art, and/or (2) its claims were obvious to one having ordinary skill in the relevant art.

[1] The Rivet patent, like all patents properly issued, is entitled to a presumption of validity. 35 U.S.C. § 282. Wilco bears the burden of showing the invalidity of a patent regular on its face. *E.g., Farmhand, Inc. v. Anel Engineering Industries, Inc.*, 693 F.2d 1140 (5th Cir.1982); *Parker v. Motorola, Inc.*, 524 F.2d 518, 521 (5th Cir.1975) (describing various measures of proof applied and concluding that more than a "preponderance of the evidence" is required). *cert. denied*, 425 U.S. 975, 96 S.Ct. 2175, 48 L.Ed.2d 799 (1976).

1. Wilco's appeal originally included an attorney fees issue. We noted, and Wilco agreed, that the issue was raised prematurely. By stipulation briefing Wilco waived, at this time, the attorney's fees appeal, leaving that issue to be considered with the second phase of the bifurcated trial. We find that the issues Wilco ultimately urges to this court are properly before us.

1. Anticipation and the Prior Art

[2-4] To be patentable, an invention must be novel. 35 U.S.C. § 102. The defense of anticipation, derived principally from § 102(a), is strictly technical, requiring a showing of actual identity in the prior art. *Steelcase, Inc. v. DeLuxe Furniture Co., Inc.*, 578 F.2d 74 (5th Cir.), *cert. denied*, 440 U.S. 960, 99 S.Ct. 1503, 59 L.Ed.2d 774 (1978). Indeed, "unless all of the same elements or their equivalents are found in substantially the same situation where they do substantially the same work in the same way, there is no anticipation." *Continental Oil Co. v. Cole*, 634 F.2d 188, 195 (5th Cir.) (footnote omitted), *cert. denied*, 454 U.S. 830, 102 S.Ct. 124, 70 L.Ed.2d 106 (1981).

[5] The district court found that Wilco failed to establish the existence of any prior art which disclosed all or substantially all of the elements claimed under the Rivet patent. Although Wilco argues that prior public use involved vertical bulkheads, spaced I-beams, and support blocks, there is no suggestion that all three elements were found together in any previous unit. Further, many of the prior uses Wilco urges are in fact found in somewhat similar but distinct situations, such as airplane pontoons. While such uses offer a glimpse of what may have been apparent in the art, they do not provide a sufficient basis upon which to negate novelty. Wilco has not established that the Rivet patent was anticipated in the prior art.

[6] Wilco claims that its burden should be lightened in this case and the presumption of validity lessened, suggesting that the prior art placed before the Patent Of-

2. Section 102(a) provides that one is entitled to a patent unless "the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent."

Prior art may also invalidate a patent even where the invention is not identically disclosed as required by § 102, if the distinguishing feature is obvious. 35 U.S.C. § 103.

(*See* 69 F.2d 151 (1963))

file in the course of its review and approval of the Rivet patent was inadequate. See, *e.g., Catholic Protection Service v. American Smelting & Refining Co.*, 594 F.2d 499 (5th Cir.), *cert. denied*, 444 U.S. 965, 100 S.Ct. 453, 62 L.Ed.2d 378 (1979). This claim is not supported by the file wrapper. Although Rivet's application did not list every prior art device which contained some element found on his marsh buggy, it presented the Examiner with the pertinent prior art, including the relevant references to each element distinguishing Rivet's craft from Reynolds' and Reynolds-type crafts.

[7, 8] The *raison d'être* of the prior art requirement includes the notion of fair disclosure by applicants so that the Patent Office may adequately consider previous inventions. Fair disclosure is not endless or absolute disclosure. It suffices if the Patent Office is not misled and has a meaningful opportunity to compare pertinent prior art. We have cautioned in the context of a fair trade/antitrust dispute:

Fair dealing . . . is not a mechanical mandate that every patent ultimately cited by the Examiner in issuing the patent or, more so, by the unlimited industry [of counsel] in a years-later infringement suit in which every writing, periodical, or patent, foreign or domestic, is dredged up as prior art, must be cited in the application. *Beckon, Dickinson & Co. v. Sherwood Medical Industries, Inc.*, 516 F.2d 514, 524 (5th Cir.1975). Wilco has not shown that Rivet inadequately disclosed, or that the Patent Office failed to consider, relevant prior art sufficient to cast doubt upon the patent's validity.

2. Obviousness

Wilco also claims that the Rivet patent is invalid for obviousness. This defense derives from 35 U.S.C. § 103, which prescribes that no valid patent will issue if the differences between the invention sought to be patented and the prior art are such that the invention "as a whole would have been obvious."

3. Moreover, the record supports an inference that one of these elements—Rivet's pontoon structure—was itself unique and nonobvious.

vious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains."

[9] Wilco again invites our attention to prior art devices which relate to elements of the Rivet invention. But "[t]he touchpin is not whether the individual components of the . . . patent were obvious at the time of the invention, but whether the aggregation produced a new or different result or achieved a synergistic effect." *Continental Oil Co.*, 634 F.2d at 197. In this sense the inquiry under § 103 is whether prior use makes the picture on the jigsaw puzzle, rather than its pieces, obvious.

[10, 11] Because this appeal involves a combination patent, in judging obviousness we look to the aggregate effect. Courts are reluctant to find inventiveness in an amalgamation of old ideas, see *Sakurada v. Ag Pro, Inc.*, 425 U.S. 273, 96 S.Ct. 1532, 47 L.Ed.2d 784 (1976), so that combination patents, to be valid, must produce an unexpected, unusual or synergistic result. The inquiry is nothing more than an instance of gestalt analysis: Is the whole greater than the sum of its parts? *Farmhand*, 693 F.2d at 1144-45; *Whitley v. Road Corp.*, 624 F.2d 698 (5th Cir.1980).

[12] Even though many of the elements of the Rivet patent can be separately found in the prior art, the combination is striking. No previous craft was capable of traveling safely for extended periods through swamp-filled swamps. None could carry the heavy loads demanded by oil-related exploration and construction. The improvements to prior craft, were merely quantitative. The one craft combining these features—the Rivet model—made a quantum leap in transportation through the swamp. Other machines may have used two of the three modifications Rivet made, but two-out-of-three did not create a new buggy capable of matching the performance of the Rivet craft.² This synergistic effect of the triad modifications twices the charge of obviousness.

bolstering the court's finding of validity, irrespective of the dramatic value of the combination of pontoon, block and I-beam.

[13] The district court's finding of non-obviousness is further supported by such economic considerations as commercial success, copying, and previous need and failure. See *Graham v. John Deere Co.*, 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545 (1966); *Continental Oil Co.*, 634 F.2d at 197 & n.5 (others had tried in vain for three years to produce a working paravane). The limitations of the Reynolds craft, when tested outside its intended uses, were immediately apparent. No definitive improvement was offered for over twenty years. We conclude that the Rivet patent was innovatively different and not readily obvious to one in Rivet's position and is therefore valid.

Infringement

[14] The final issue is whether Wilco's marsh buggy infringes the Rivet patent. Wilco suggests a number of modifications which, it is claimed, distinguish Wilco's product from Rivet's patent. These alterations may suffice to prevent literal infringement of some of the claims of the Rivet patent, but the doctrine of equivalents gives a patentee broad protection from minor deviations. *Ziegler v. Phillips Petroleum Co.*, 483 F.2d 858 (5th Cir.), cert. denied, 414 U.S. 1079, 94 S.Ct. 597, 38 L.Ed.2d 485 (1973).

[15] We need not belabor the point. Suffice it to say that a comparison of the two craft reveals substantial identity of means, operation and result. The differences are cosmetic and trivial. The essence of both vehicles is the same: each relies on the Rivet improvements. Wilco's models fringe the Rivet patent.

AFFIRMED.

RICHARD A. CHERAMIE ENTERPRISES, INC., Plaintiff-Appellant.

MT. AIRY REFINING CO., in personam, Defendant-Appellee.

No. 82-3576

Summary Calendar.

United States Court of Appeals,

Fifth Circuit.

June 27, 1983.

Vessel owner filed action in admiralty to recover charges for towage services and fuel allegedly furnished alleged charterer in charter of push boat. The United States District Court for the Eastern District of Louisiana, Patrick F. Carr, J., granted alleged charterer's motion for involuntary dismissal, and vessel owner appealed. The Court of Appeals, Politz, Circuit Judge, held that finding of fact that vessel owner had not proven that person who allegedly contacted owner's sales representative and requested charter of vessel for towing barges was alleged charterer's agent was not clearly erroneous under either maritime law or Louisiana law.

Affirmed.

1. Shipping \Rightarrow 58(24)

Finding of fact that vessel owner had not proven that person who contacted owner's sales representative and requested charter of vessel for towing barges was agent of alleged charterer was not clearly erroneous under either maritime law or Louisiana law, notwithstanding alleged charterer's reference in pretrial order to person who contacted owner's sales representative as its representative. Fed.Rules Civ.Proc.Rule 52(e), 28 U.S.C.A.; LSA-C.C. art. 2985.

2. Principal and Agent \Rightarrow 8, 14(1)

Under Louisiana law, agency relationship is created by either express appointment of a mandatory under Civil Code or by implied appointment arising from apparent authority. LSA-C.C. art. 2985.

(Cite as 708 F.2d 156 (1983))

3. Principal and Agent \Rightarrow 14(2)

To establish implied agency under Louisiana law between person who arranged for push boat charter and gave daily instructions to vessel and alleged charterer, it had to be shown that alleged charterer, as principal, made some manifestation to vessel owner and that vessel owner reasonably relied on putative agent's purported authority as direct consequence of alleged charterer's representations.

4. Principal and Agent \Rightarrow 23(1)

Under Louisiana law, agency may not be established by words of purported agent.

5. Principal and Agent \Rightarrow 19

Under Louisiana law, agency relationship cannot be presumed, but must be clearly established.

6. Principal and Agent \Rightarrow 14(2)

Under Louisiana law, once agency is indicated, party preparing to deal with agent has affirmative duty to determine extent and scope of agent's authority to bind principal.

7. Principal and Agent \Rightarrow 23(1)

Under general agency principles, statements of agent cannot establish existence of agency relationship.

Lemle, Kelleher, Kohlmeier & Mathews, Mark L. Ross, New Orleans, La., for plaintiff-appellant.

Baldwin & Haspel, Conrad Meyer, IV, New Orleans, La., for defendant-appellee.

Appeal from the United States District Court for the Eastern District of Louisiana.

Before CLARK, Chief Judge, POLITZ and HIGGINBOTHAM, Circuit Judges.

POLITZ, Circuit Judge:

We examine the propriety of the trial judge's grant of a Fed.R.Cv.P. 41(b) motion in favor of the defendant. Finding no error in any finding of fact or conclusion of law, we affirm.

Facts

Richard A. Chermie Enterprises, Inc., filed this action in admiralty against Mt. Airy Refining Company for \$28,092.70, representing charges for towage services and fuel allegedly furnished Mt. Airy in the charter of the push boat VICKIE MARIE C. from January 8-24, 1981.

Raymond Shipley contacted Robert Cazayoux, a sales representative for Chermie, and requested the charter of a vessel for towing barges. On January 17, 1981, at the mid-point of the tow, the captain of Chermie's VICKIE MARIE C. refused and directed that the fuel charges be billed to Green Country Barge Lines. On January 24, 1981, Shipley notified a vice president of Chermie to terminate the charter. In the interim, the captain of the push boat had, on a daily basis, contacted Shipley for instructions.

Upon termination of the charter, Cazayoux said he billed Mt. Airy on instructions of Shipley, but that Shipley subsequently reported that he was working for someone else and requested that the billing be made to Green Country. Shipley testified that he had informed Cazayoux from the outset that the charter was for Green Country and directed billing to that entity. When an invoice was sent to Mt. Airy, Shipley said he contacted Chermie's office staff and told them they had billed in error and should send the invoice to Green Country at an address he furnished. Green Country never paid and apparently folded.

The sole issue is whether Chermie proved that Shipley was an agent acting on behalf of Mt. Airy when he arranged for the charter and gave daily instructions to the VICKIE MARIE C. Chermie contends that the resolution of this issue is foreclosed by the Pre-trial Order in which Mt. Airy purportedly admitted Shipley's status and authority. In support of this contention, Chermie points to paragraph 6(b) of the Pre-trial Order which reads in pertinent part:

A brief summary of the material facts claimed by defendant, Mt. Airy Refining Company, are:

sustained the rejection, finding that the teachings of the prior art provide a sufficient basis for a reasonable expectation of success.); *Ex parte Blanc*, 13 USPQ2d 1383 (Bd. Pat. App. & Inter. 1989) (Claims were directed to a process of sterilizing a polyolefinic composition with high-energy radiation in the presence of a phenolic polyester antioxidant to inhibit discoloration or degradation of the polyolefin. Appellant argued that it is unpredictable whether a particular antioxidant will solve the problem of discoloration or degradation. However, the Board found that because the prior art taught that appellant's preferred antioxidant is very efficient and provides better results compared with other prior art antioxidants, there would have been a reasonable expectation of success.).

AT LEAST SOME DEGREE OF PREDICTABILITY IS REQUIRED; APPLICANTS MAY PRESENT EVIDENCE SHOWING THERE WAS NO REASONABLE EXPECTATION OF SUCCESS

Obviousness does not require absolute predictability, however, at least some degree of predictability is required. Evidence showing there was no reasonable expectation of success may support a conclusion of nonobviousness. *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976) (Claims directed to a method for the commercial scale production of polyesters in the presence of a solvent at superatmospheric pressure were rejected as obvious over a reference which taught the claimed method at atmospheric pressure in view of a reference which taught the claimed process except for the presence of a solvent. The court reversed, finding there was no reasonable expectation that a process combining the prior art steps could be successfully scaled up in view of unchallenged evidence showing that the prior art processes individually could not be commercially scaled up successfully.). See also *Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d 1200, 1207-08, 18 USPQ2d 1016, 1022-23 (Fed. Cir.), *cert. denied*, 502 U.S. 856 (1991) (In the context of a biotechnology case, testimony supported the conclusion that the references did not show that there was a reasonable expectation of success.); *In re O'Farrell*, 853 F.2d 894, 903, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988) (The court held the claimed method would have been obvious

over the prior art relied upon because one reference contained a detailed enabling methodology, a suggestion to modify the prior art to produce the claimed invention, and evidence suggesting the modification would be successful.).

PREDICTABILITY IS DETERMINED AT THE TIME THE INVENTION WAS MADE

Whether an art is predictable or whether the proposed modification or combination of the prior art has a reasonable expectation of success is determined at the time the invention was made. *Ex parte Erlich*, 3 USPQ2d 1011 (Bd. Pat. App. & Inter. 1986) (Although an earlier case reversed a rejection because of unpredictability in the field of monoclonal antibodies, the court found "in this case at the time this invention was made, one of ordinary skill in the art would have been motivated to produce monoclonal antibodies specific for human fibroblast interferon using the method of [the prior art] with a reasonable expectation of success." 3 USPQ2d at 1016 (emphasis in original).).

2143.03 All Claim Limitations Must Be Taught or Suggested

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

INDEFINITE LIMITATIONS MUST BE CONSIDERED

A claim limitation which is considered indefinite cannot be disregarded. If a claim is subject to more than one interpretation, at least one of which would render the claim unpatentable over the prior art, the examiner should reject the claim as indefinite under 35 U.S.C. 112, second paragraph (see MPEP § 706.03(d)) and should reject the claim over the prior art based on the interpretation of the claim that ren-

ders the prior art applicable. *Ex parte Ionescu*, 222 USPQ 537 (Bd. Pat. App. & Inter. 1984) (Claims on appeal were rejected on indefiniteness grounds only; the rejection was reversed and the case remanded to the examiner for consideration of pertinent prior art.). Compare *In re Wilson*, 424 F.2d 1382, 165 USPQ 494 (CCPA 1970) (if no reasonably definite meaning can be ascribed to certain claim language, the claim is indefinite, not obvious) and *In re Steele*, 305 F.2d 859, 134 USPQ 292 (CCPA 1962) (it is improper to rely on speculative assumptions regarding the meaning of a claim and then base a rejection under 35 U.S.C. 103 on these assumptions).

LIMITATIONS WHICH DO NOT FIND SUPPORT IN THE ORIGINAL SPECIFICATION MUST BE CONSIDERED

When evaluating claims for obviousness under 35 U.S.C. 103, all the limitations of the claims must be considered and given weight, including limitations which do not find support in the specification as originally filed (i.e., new matter). *Ex parte Grasselli*, 231 USPQ 393 (Bd. App. 1983) *aff'd mem.* 738 F.2d 453 (Fed. Cir. 1984) (Claim to a catalyst expressly excluded the presence of sulfur, halogen, uranium, and a combination of vanadium and phosphorous. Although the negative limitations excluding these elements did not appear in the specification as filed, it was error to disregard these limitations when determining whether the claimed invention would have been obvious in view of the prior art.).

2144 Sources of Rationale Supporting a Rejection Under 35 U.S.C. 103

RATIONALE MAY BE IN A REFERENCE, OR REASONED FROM COMMON KNOWLEDGE IN THE ART, SCIENTIFIC PRINCIPLES, ART-RECOGNIZED EQUIVALENTS, OR LEGAL PRECEDENT

The rationale to modify or combine the prior art does not have to be expressly stated in the prior art; the rationale may be expressly or impliedly contained in the prior art or it may be reasoned from knowledge generally available to one of ordinary skill in the art, established scientific principles, or legal precedent established by prior case law. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*,

958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). See also *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) (setting forth test for implicit teachings); *In re Eli Lilly & Co.*, 902 F.2d 943, 14 USPQ2d 1741 (Fed. Cir. 1990) (discussion of reliance on legal precedent); *In re Nilssen*, 851 F.2d 1401, 1403, 7 USPQ2d 1500, 1502 (Fed. Cir. 1988) (references do not have to explicitly suggest combining teachings); *Ex parte Clapp*, 227 USPQ 972 (Bd. Pat. App. & Inter. 1985) (examiner must present convincing line of reasoning supporting rejection); and *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993) (reliance on logic and sound scientific reasoning).

THE EXPECTATION OF SOME ADVANTAGE IS THE STRONGEST RATIONALE FOR COMBINING REFERENCES

The strongest rationale for combining references is a recognition, expressly or impliedly in the prior art or drawn from a convincing line of reasoning based on established scientific principles or legal precedent, that some advantage or expected beneficial result would have been produced by their combination. *In re Sernaker*, 702 F.2d 989, 994-95, 217 USPQ 1, 5-6 (Fed. Cir. 1983).

LEGAL PRECEDENT CAN PROVIDE THE RATIONALE SUPPORTING OBVIOUSNESS ONLY IF THE FACTS IN THE CASE ARE SUFFICIENTLY SIMILAR TO THOSE IN THE APPLICATION

The examiner must apply the law consistently to each application after considering all the relevant facts. If the facts in a prior legal decision are sufficiently similar to those in an application under examination, the examiner may use the rationale used by the court. If the applicant has demonstrated the criticality of a specific limitation, it would not be appropriate to rely solely on case law as the rationale to support an obviousness rejection. "The value of the exceedingly large body of precedent wherein our predecessor courts and this court have applied the law of obviousness to particular facts, is that there has been built a wide spectrum of illustrations and accompanying reasoning, that have been melded into a fairly consistent application of law to a great variety of facts." *In re Eli*

FULL TEXT OF CASES (USPQ2D)

All Other Cases

**B.F. Goodrich Co. v. Aircraft Braking Systems Corp. (CA FC) 37
USPQ2d 1314 B.F. Goodrich Co. v. Aircraft Braking Systems Corp.**

**U.S. Court of Appeals Federal Circuit
37 USPQ2d 1314**

**Decided January 4, 1996
Nos. 95-1112, -1120, -1143**

Headnotes

PATENTS

1. Patentability/Validity -- Obviousness -- Relevant prior art -- Particular inventions (§ 115.0903.03)

Patentability/Validity -- Obviousness -- Secondary considerations generally (§ 115.0907)

Aircraft disk brake assembly employing alternating thick and thin carbon disks is obvious over prior reference describing maintenance schedule for disk brake assembly, since only difference between reference and invention in suit is that asserted claims are limited to initial thick/thin assembly, whereas reference discloses thick/thin arrangement only for replacement of half-worn disks during overhaul, since reference, which teaches maximizing carbon utilization by filling available disk space in brake with any combination of new, partly worn, or reclaimed disks, suggests use of initial thick/thin assembly to one skilled in art, and since secondary considerations are not convincing of nonobviousness in view of minor difference between claimed invention and teachings of reference.

2. Practice and procedure in Patent and Trademark Office -- Prosecution -- Duty of candor -- In general (§ 110.0903.01)

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<http://www.bna.com/corp/index.html#V>

REMEDIES

Monetary -- Attorneys' fees; costs -- Patents -- Exceptional case (§ 510.0905.03)

Federal district court did not clearly err in its findings or abuse its discretion in determining that infringement plaintiff did not engage in inequitable conduct by failing to disclose material prior art references to Patent and Trademark Office during prosecution of patents in suit, since court's

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conclusion that evidence of requisite intent to deceive is lacking cannot be held clearly erroneous; plaintiff's conduct in prosecuting patents in suit cannot be condoned, however, since that conduct, including failure to disclose activities that may have implicated on-sale bar of 35 USC 102(b), and submission of careless statements under oath, shows pattern of careless prosecution that led to grant of patents which are invalid over withheld reference.

Particular patents -- General and mechanical -- Disk brakes

4,742,895, Bok, disk brake assembly, judgment of invalidity affirmed.

4,613,017, Bok, disk brake and method of assembly, judgment of invalidity affirmed.

Case History and Disposition:

Page 1315

Appeal from the U.S. District Court for the District of Delaware, Robinson, J.

Action by The B.F. Goodrich Co. against Aircraft Braking Systems Corp. and Allied-Signal Inc., for patent infringement. From judgment holding patents in suit invalid but finding that plaintiff did not engage in inequitable conduct, parties cross-appeal. Affirmed.

Related decision: 27 USPQ2d 1209

Attorneys:

Harry J. Roper, of Roper & Quigg, Chicago, Ill.; William P. Oberhardt, Raymond N. Nimrod, Ellen D. Law, and Sarah L. Taylor, of Roper & Quigg, Chicago, for B.F. Goodrich Co.

Ray L. Weber, of Renner, Kenner, Greive, Bobak, Taylor & Weber, Akron, Ohio, for

Aircraft Braking Systems Corp.

Kenneth W. Starr, of Kirkland & Ellis, Washington, D.C.; Donald G. Kempf Jr., David M. Elston, and Jonathan F. Putnam, of Kirkland & Ellis, Chicago, for Allied-Signal Inc.

Judge:

Before Archer, chief judge, and Newman and Lourie, circuit judges.

Opinion Text**Opinion By:**

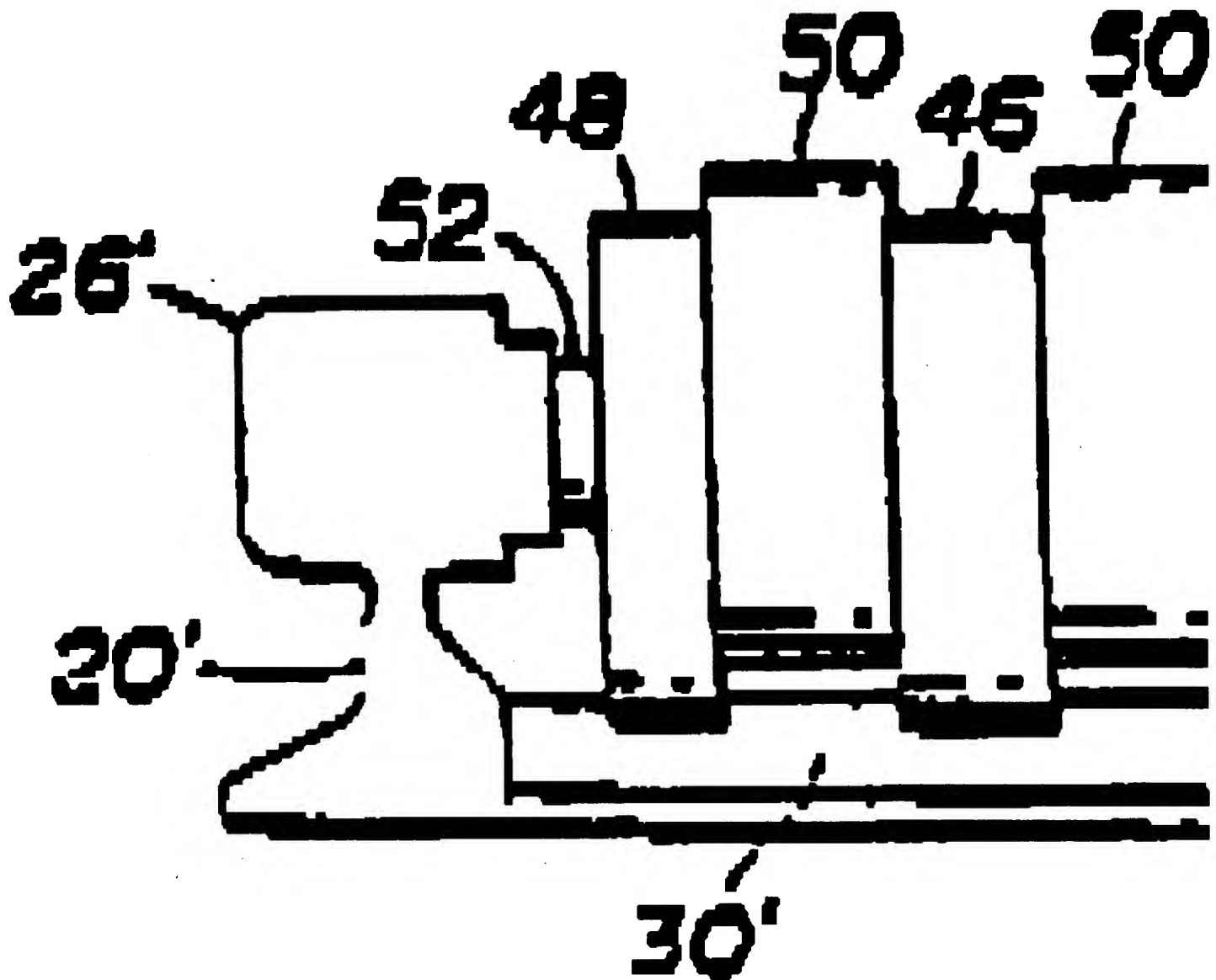
Lourie, J.

The B.F. Goodrich Co. (BFG) appeals from the judgment of the United States District Court for the District of Delaware holding (1) U.S. Patents 4,742,895 and 4,613,017 invalid under 35 U.S.C. Sections 103 and 102(b) and (2) that Aircraft Braking Systems Corp. (ABS) did not infringe either patent. ABS and Allied-Signal Inc. cross-appeal from the district court's judgment that BFG did not engage in inequitable conduct, requesting that the court hold this to be an exceptional case and award them attorney fees under 35 U.S.C. Section 285. *B.F. Goodrich Co. v. Aircraft Braking Sys.*, C.A. Nos. 91-48/91-515-SLR (D. Del. Nov. 10, 1994). Because we conclude that the patents are invalid under 35 U.S.C. Section 103 and that BFG did not engage in inequitable conduct, we affirm.

BACKGROUND

BFG is the assignee of the '017 and '895 patents. The '017 patent is directed to a method of overhauling a disk brake assembly. The '895 patent is a division of the '017 patent and contains apparatus claims for a disk brake assembly. Both patents are entitled to the benefit of the '017 patent's July 2, 1984 filing date and thus July 2, 1983 is the critical date for purposes of 35 U.S.C. Section 102.

The claimed brake assembly is used in aircraft landing gear wheels. Figure 4 of the patents is a cross-sectional view illustrating the assembly:



The assembly includes stators 46 positioned between rotors 50. The stators 46 and rotors 50 consist of carbon disks and are sandwiched between end plates 48. The rotors 50 are mechanically attached to a rim (not shown) on which is mounted a tire so that, when the wheel rotates, rotors 50 rotate between stators 46. When the brake is activated, piston 26' applies pressure to one of the two end plates 48, which in turn forces together the rotors and stators against end plate 44 so that the resulting friction between the rotors and stators stops the wheel. Eventually, the carbon disks become worn through friction and must be replaced since a minimum thickness of the disks is required to absorb the heat generated by the friction and ensure effective braking operation.

The invention provides a brake assembly having alternating thick and thin disks, referred to as a thick/thin assembly, consisting of, for example, thin stators and thick rotors. The disks tend to wear evenly. Accordingly, when the thin disks become worn to the point of requiring replacement, the thick disks are only half worn. Only the original thin disks are replaced, and they are replaced with thick disks. The process can be repeated, and, during each maintenance interval, only half of the disks are thus replaced.

In comparison, prior art brake assemblies had disks of uniform thickness. During prosecution, the patentee distinguished its invention over this feature of the prior art brake assemblies. In response to a final rejection of

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the '017 patent on the ground of obviousness, the applicant submitted an affidavit by Wesley S. Perry, Director of Engineering for BFG. The following are relevant portions of the Perry affidavit.

That . . . he has not seen or heard of the brake construction and method shown and described in the [BFG patent application];

That as Director of Engineering he had the responsibility for reading the literature and trade journals on aircraft brakes and has attended numerous seminars and trade shows on aircraft brakes;

That at no time in the literature or at seminars and trade shows he has attended, has the brake construction and method shown and described in the [BFG patent application] been suggested;

That the common practice in overhauling carbon brakes is to replace all the brake disks after they are substantially completely worn with full thickness disks and that it would not be obvious to replace one set of stators or rotors with a new or refurbished set of full thickness disks while the other set is half worn at overhaul intervals shorter than the refurbished interval for the disks as taught and shown in the [BFG patent application];

That based on his observation and knowledge of the ordinary skilled worker overhauling carbon brakes, the ordinary skilled worker would not have found it expedient through routine experimentation to arrange the rotors and stators of a carbon disk brake with different available wear portions so that after a predetermined number of brake applications said available wear portions of a first group of disks are substantially worn away at an intermediate overhaul time and said available wear portions of a second group of disks are not worn away.

In response to the submission of this affidavit, the U.S. Patent and Trademark Office (PTO) allowed the application, which issued as the '017 patent. The PTO subsequently allowed the divisional application, which issued as the '895 patent. Claim 1 of the '017 patent and claim 2 of the '895 patent, which are the only independent claims at issue, read as follows:

1. A method of assembling and overhauling a disk brake having a plurality of disks with available wear portions of predetermined different thicknesses comprising positioning a first group of said disks in overlapping relationship with a second group of said disks, said first group of said disks having each of said available wear portions of a first thickness, said second group of said disks having each of said available wear portions of a second thickness, said first thickness of each of said available wear portions of said first group of said disks being less than said second thickness of each of said available wear portions of said second group of said disks, replacing said first group of said disks with a third group of said disks at an intermediate brake overhaul time when said available wear portions of said first group are substantially fully worn, said available wear portions of each of said third group of said disks having a third thickness greater than the thickness of each of said available wear portions of said second group of said disks at said intermediate brake overhaul time.
2. A disk brake assembly comprising a first group of brake disks and a second group of brake disks in axially aligned and interleaved relationship, said disks of said first group being interleaved with said disks of said second group in alternating relationship, each of said disks of said first group and said second group having oppositely disposed wear surfaces, said wear surfaces on opposite sides of each brake disk of said first group are equal in thickness, said wear surfaces on opposite sides of each brake disk of said second group are equal in thickness, said wear surfaces of said first group of said disks having a first thickness, said wear surfaces of said second group of said disks having a second thickness, said first thickness of said first group of said disks being less than said second thickness of said second group of said disks whereby after a predetermined number of brake applications

the available wear thickness of said first group of said disks are substantially fully worn away at an intermediate overhaul time and said available wear thickness of said second group of said disks are not worn away.

During prosecution of the patents, the PTO was apparently not aware of, and hence did not consider, a published paper by employees of Dunlop Ltd. This paper, entitled *The Economic and Safety Aspects of Commercial Aircraft Carbon Brakes* [hereinafter Dunlop], was presented at the International Federation of Airworthiness Annual Conference in Long Beach, California, in April 1982. Although several individuals at BFG had copies of Dunlop in their files, BFG did not cite it to the PTO during prosecution of the patent applications. Relevant portions of Dunlop describe what is referred to as a 2 for 1 refurbishment scheme in which two

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worn disks are machined to smoothness and then clipped together to form one "new" disk. Dunlop describes how these thicker 2 for 1 disks can be used with new disks:

Following brake chassis inspection the heat stack can either be put back into the brake for the remainder of its life, or some of the half worn discs can be assembled with re-furbished discs from other brakes. Because of this arrangement it is possible to use reclaimed discs which are thicker than new discs. In other words, during the machining for reclaim [sic] the minimum amount of carbon has been machined off in order not to waste any of this expensive material. Individually these extra thick discs have a life potential well in excess of 3,000 landings. By the use of this half life inspection routine, and by using extra thick discs mixed with part worn discs the cost per brake landing can be reduced significantly.

Id. at 11. Dunlop also teaches obtaining maximum use of the carbon disks by building up the heat stack to fill the space available for the disks by using a combination of new and refurbished disks. *Id.* at 12.

In addition, Dunlop describes brake overhaul schedules using the 2 for 1 refurbishment technique. A chart in Dunlop illustrates the overhaul schedules. Aircraft are listed on the left side of the chart, and the months from October 1984 through June 1988 are listed across the top of the chart. The chart contains boxes representing a particular overhaul for the corresponding aircraft and month. The chart also contains a description of several overhaul routines, the most relevant of which are referred to as overhaul combinations 3 and 5. The description for combination 3 states: "New stators, pressure and thrust stators, half worn rotors." That for combination 5 states: "New rotors, half worn stators, pressure and thrust stators." Combinations 3 and 5, therefore, together describe an overhaul scheme involving a thick/thin aircraft brake assembly.

BFG also failed to submit to the PTO other prior art that it was aware of during its prosecution of the patents. This prior art included a Concorde manual, which describes a brake overhaul method used on the Concorde, which was the first commercial aircraft to use carbon disk brakes. According to this method, new or partially worn disks were placed in the brake assembly during overhaul. Thus, after use in this manner, the carbon disks in the Concorde brake had varying thicknesses.

Other prior art also included U.S. Patent 3,480,115, which describes a brake assembly having steel disks arranged in descending order of thickness. BFG had itself used brake assemblies with steel rotors of different wear thicknesses.

BFG also failed to notify the PTO of certain of its own activities which may have implicated the on-sale bar under 35 U.S.C. Section 102(b). BFG made a presentation in France to Airbus Industries, which has customers in the United States, concerning the brake assembly in January 1983. Later, BFG met with representatives of Boeing on March 24, 1983 in Seattle, Washington, in order to discuss BFG's carbon brakes. This meeting was part of an ongoing effort by BFG to interest Boeing in its thick/thin carbon aircraft brake assemblies. Even though these activities occurred before the critical date, BFG failed to disclose them to the PTO during prosecution of the '017 and '895 patents. Moreover, the inventor, Lowell D. Bok, stated in his invention record, which he submitted to a BFG in-house attorney, that the BFG thick/thin brake assemblies had been "proposed for the 757-200, A310-300 and 767-300 Aircraft [.]"

BFG sued ABS and Allied-Signal separately for infringement of claims 2 and 3 of the '895 patent and claims 1-4 of the '017 patent. Both defendants counterclaimed for a declaratory judgment of invalidity and unenforceability, and the cases were consolidated for discovery and a bench trial. In its memorandum opinion following the trial, the district court held that: (1) claims 2 and 3 of the '895 patent and claims 1-4 of the '017 patent were invalid under 35 U.S.C. Section 103 as having been obvious over Dunlop and under 35 U.S.C. Section 102(b) as having been on sale by virtue of BFG's activities before the critical date; (2) Allied-Signal infringed claims 2 and 3 of the '895 patent and claims 1-4 of the '017 patent; (3) ABS did not infringe any of the asserted claims; and (4) BFG did not engage in inequitable conduct during prosecution of the patents. On appeal, BFG challenges the district court's decision on validity and on infringement by ABS. On cross-appeal, ABS and Allied-Signal challenge the district court's holding that BFG did not engage in inequitable conduct.

DISCUSSION

A. Obviousness

We review the district court's conclusion of obviousness *de novo* as a matter of law. See *Jervis B. Webb Co. v. Southern Sys., Inc.*, 742 F.2d 1388, 1393, 222 USPQ 943, 946 (Fed. Cir. 1984). A determination of obviousness is based on factual inquiries, *Graham v. John Deere Co.*, 383 U.S. 1,

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17-18, 148 USPQ 459, 467 (1966), which we review under the clearly erroneous standard. Fed. R. Civ. P. 52(a); *Webb*, 742 F.2d at 1393, 222 USPQ at 946; see also *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1050, 5 USPQ2d 1434, 1438 (Fed. Cir.) ("The factual findings of the district court underlying the obviousness determination will be overturned on appeal only if they are clearly erroneous."), *cert. denied*, 488 U.S. 825 (1988).

BFG argues that the district court erred in holding the inventions of the '895 and '017 patents to have been obvious over Dunlop. BFG contends that there was no suggestion or motivation to modify the teachings of Dunlop to obtain the claimed invention. In addition, BFG alleges that the district court misconstrued or failed to credit evidence of secondary considerations such as commercial success, copying by others, satisfying a long-felt need, and providing significant unexpected advantages.

ABS and Allied-Signal counter that the district court did not err in finding the invention to have been obvious over Dunlop. They contend that Dunlop suggested the claimed invention to one skilled in the art. They further argue that the evidence of secondary considerations presented by BFG only served to reinforce the conclusion of obviousness.

Obviousness under 35 U.S.C. Section 103 is a legal conclusion involving four factual inquiries. *Uniroyal*, 837 F.2d at 1050, 5 USPQ2d at 1438. These inquiries consist of: "(1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of nonobviousness." *Id.* Secondary considerations include evidence of factors tending to show nonobviousness, such as commercial success of the invention, satisfying a long-felt need, failure of others to find a solution to the problem at hand, and copying of the invention by others. *Id.*; *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566, 1 USPQ2d 1593, 1595 (Fed. Cir.), *cert. denied*, 481 U.S. 1052 (1987).

When obviousness is based on a particular prior art reference, there must be a showing of a suggestion or motivation to modify the teachings of that reference. *E.g.*, *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). This suggestion or motivation need not be expressly stated. *Cable Elec. Prods., Inc. v. Genmark, Inc.*, 770 F.2d 1015, 1025, 226 USPQ 881, 886 (Fed. Cir. 1985).

The district court found that the invention was obvious over Dunlop. The level of ordinary skill in the art was not in dispute, nor was the scope of the prior art, which included the Dunlop paper, the steel brake art such as was

described in U.S. Patent 3,480,115, and the Concorde manual. The difference between Dunlop and the claimed inventions is relatively minor. The district court found that the only real difference is that the claims are limited to an *initial* thick/thin assembly whereas Dunlop discloses the thick/thin arrangement only for replacement of half-worn disks during brake overhaul. The district court stated that "Figure 14 [the overhaul schedule] plainly contemplates the continuation of the series of overhauls beyond the last date covered in the chart." The district court held that the overhaul schedule in Dunlop itself provided the suggestion for an initial thick/thin carbon brake assembly and hence rendered the claimed invention obvious.

The district court also analyzed the secondary considerations presented by BFG. It did not find that they overcame the strong teachings of the prior art. The assertion of "long-felt need" was discounted because the BFG invention was similar to the teachings of Dunlop. The failure of others was not found to be significant because there was only a brief time period during which manufacturers sought a solution to the problem of increased carbon utilization in aircraft brakes. Only slight evidence of skepticism by others was presented. Copying by others was not found to be compelling because there was no extensive development by competitors, and a noninfringing substitute was easily designed. The advantages of the invention were not found to be necessarily unexpected given the state of the prior art. Finally, the district court found that the evidence of commercial success was ambiguous.

We conclude that the district court's factual findings regarding the four *Graham* inquiries were not clearly erroneous. See Fed. R. Civ. P. 52(a) (1995). As explained above, these findings were supported by the evidence of record, and we do not have a definite and firm conviction that a mistake was made as to those findings. See *United States v. United States Gypsum Co.*, 333 U.S. 364, 395 [76 USPQ 430] (1948) ("A finding is 'clearly erroneous' when although there is evidence to support it, the reviewing court on the entire evidence is left with the definite and firm conviction that a mistake has been committed.").

[1] In addition, we agree with the district court's ultimate conclusion of obviousness. As the district court recognized, the overhaul schedule in Dunlop contemplates continuation of the combination 3 and 5 overhaul methods. Dunlop also teaches maximizing

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carbon utilization by filling the "envelope," the space available for disks in the brake, using any combination of new or part worn or reclaimed disks. In addition, ABS's and Allied-Signal's expert witness, as well as BFG's expert witness, testified that those skilled in the art would know to fill the brake "envelope" to obtain maximum use of the available space. BFG has indicated a connection between an initial thick/thin assembly and "filling the envelope." Moreover, as the inventor himself agreed, if a thick/thin arrangement makes sense for an overhaul, it would seem to be logical to adopt it *ab initio*. Accordingly, the teachings of Dunlop, to one skilled in the art, provide a suggestion of an initial thick/thin brake assembly. We also agree with the district court that the secondary considerations were not convincing of nonobviousness. Considering the minor difference between the claimed invention and the teachings of Dunlop, the secondary considerations were not sufficiently compelling. See *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 291-92, 227 USPQ 657, 663 (Fed. Cir. 1985).

Because we hold that claims 2 and 3 of the '895 patent and claims 1-4 of the '017 patent are invalid as having been obvious over Dunlop, we need not reach the issues relating to the on-sale bar and infringement.

B. Inequitable Conduct

A determination of inequitable conduct is committed to the district court's discretion. Accordingly, we review the district court's judgment under the abuse of discretion standard. *Kingsdown Medical Consultants, Ltd. v. Hollister, Inc.*, 863 F.2d 867, 876, 9 USPQ2d 1384, 1392 (Fed. Cir. 1988), *cert. denied*, 490 U.S. 1067 (1989). To overturn such a discretionary ruling of a district court, "the appellant must establish that the ruling is based on clearly erroneous findings of fact or on a misapplication or misinterpretation of applicable law, or

evidences a clear error of judgment on the part of the district court." *Molins PLC v. Textron, Inc.*, 48 F.3d 1172, 1178, 33 USPQ2d 1823, 1827 (Fed. Cir. 1995).

ABS and Allied-Signal allege inequitable conduct with respect to several pieces of prior art. In particular, they allege that BFG engaged in inequitable conduct in its failure to disclose to the PTO Dunlop, the Concorde manual, U.S. Patent 3,480,115 showing an example of the steel brake art, BFG's own steel brake prior art, and BFG's activities with Boeing and Airbus. They also allege that the statements in the Perry affidavit provide evidence of an intent to mislead.

BFG argues that there was no intent by the inventor, Bok, or his attorneys to mislead the PTO. BFG asserts that there is no evidence that Bok or his attorneys knew of Dunlop during prosecution. While they of course knew of the Boeing and Airbus activities, BFG argues that it had a reasonable belief that these activities did not violate the on-sale bar. BFG also argues that the Perry affidavit does not show an intent to mislead the PTO, because all the statements in the affidavit were true.

Inequitable conduct consists of an "affirmative misrepresentation of a material fact, failure to disclose material information, or submission of false material information, coupled with an intent to deceive." *Molins*, 48 F.3d at 1178, 33 USPQ2d at 1826. One alleging inequitable conduct must prove the threshold elements of materiality and intent by clear and convincing evidence. *Id.*, 33 USPQ2d at 1826-27. The district court must then weigh the threshold findings of materiality and intent in light of all the circumstances to determine whether the equities warrant a conclusion that inequitable conduct occurred. *Id.*

Much of the prior art involved here certainly was material. Dunlop was directly relevant to the problem addressed by the '017 and '895 patents; it discloses techniques for increased carbon utilization in aircraft brakes, as well as a thick/thin aircraft brake assembly. BFG's sales activities were also material, because they were potential statutory bars under 35 U.S.C. Section 102(b). The steel brake art included brakes having steel disks of varying thickness, and the Concorde manual disclosed carbon brakes with disks of varying thickness. All of this prior art was thus arguably material.

The focus of the inequitable conduct issue in this case must thus be on intent, which is a question of fact. *See Molins*, 48 F.3d at 1178, 33 USPQ2d at 1827. We must affirm the district court on this issue unless its finding was clearly erroneous. *Id.* The district court was troubled by BFG's conduct, but essentially gave it the benefit of the doubt because determinations of obviousness and the applicability of the on-sale bar are often close and subject to varying reasonable interpretations. In particular, the district court stated that "[t]he application of the on-sale bar in Section 102(b) and the factors determining obviousness under Section 103 is by no means a certain enterprise, and the fact that the Court has found the patents invalid on these grounds does not mean that BFG's failure to submit this art and information in connection with its patent applications was intentionally misleading."

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[2] We too are troubled by BFG's conduct, but conclude that the district court did not clearly err in its findings or abuse its discretion in determining that BFG did not engage in inequitable conduct. "[A] finding that particular conduct amounts to 'gross negligence' does not of itself justify an inference of intent to deceive; the involved conduct, viewed in light of all the evidence, including evidence indicative of good faith, must indicate sufficient culpability to require a finding of intent to deceive." *Kingsdown*, 863 F.2d at 876, 9 USPQ2d at 1392.

There was a basis for the patent attorney prosecuting the applications to conclude that BFG's meeting with Boeing did not trigger the on-sale bar on the ground that it was a technical, not a sales, meeting, and thus that it need not have been disclosed to the PTO. Prudence would have dictated otherwise, but the requisite evidence of intent to deceive is lacking. In addition, the Airbus activity seemingly occurred outside the United States, and its nondisclosure does not reveal an intent to deceive. Even though Dunlop was in the files of several BFG employees, it is not clear that Bok and his attorney possessed it. The evidence tends to show that Bok only became

aware of Dunlop after the '017 and '895 patents issued, and the patent attorney was not on the circulation list to receive the publication. There is also a letter of record from BFG to a foreign attorney indicating after the patents issued that BFG had just recently become aware of Dunlop. The other alleged prior art is similarly not associated with evidence of an intent to deceive.

The Perry affidavit is more troubling, but also falls short of providing an inference of an intent to mislead the PTO. While the statements in the affidavit are true, as BFG asserts, this alone does not negate a finding of inequitable conduct, since truthful statements can be crafted in a misleading manner through intentional omission of particular relevant facts. However, there is no evidence of intentional omission of relevant facts in the affidavit and, in particular, no evidence that Perry in fact knew of Dunlop. While Perry was not called as a witness at trial due to an agreement between the parties, relevant portions of his deposition transcript are of record. In Perry's deposition, he testified that he "may have seen it [Dunlop] before," but did not "specifically remember seeing it." He also testified that he did not recall seeing the copy of Dunlop on which his name was handwritten as part of a circulation list. The district court's conclusion that evidence of intent to deceive is lacking cannot be said to be clearly erroneous.

We have considered whether the totality of the actions here lead to an inference of an intent to deceive even though the individual instances do not. We arrive at the same conclusion, lack of evidence of intent. It is not surprising that those who are careless exhibit those qualities more than once. It still does not demonstrate, without more, an intent to deceive. Accordingly, we conclude that the district court did not clearly err in its finding of lack of intent to deceive or abuse its discretion in finding that BFG did not engage in inequitable conduct. In the absence of an intent to deceive, courts cannot find inequitable conduct merely because patents are held invalid over the relevant prior art. Having affirmed the district court's conclusion that there was no inequitable conduct, we also affirm its conclusion that this case was not exceptional and hence its denial of attorney fees.

Our conclusion does not mean, however, that we condone BFG's conduct in prosecuting the '017 and '895 patents. Barely dodging a bullet based on our deference to a trial court's decision on the factual question of intent and on a matter of equity does not merit approval or justify complacency. BFG's conduct shows a pattern of careless patent prosecution. It has led to the grant of a patent which is invalid over a withheld reference. While we have not reviewed the holding of invalidity based upon the on-sale bar, there certainly was a close question concerning that uncited event. The Perry affidavit evidences questionable conduct, considering that Perry's name was on a circulation list for Dunlop and that he stated in his affidavit that he was responsible for knowing the literature on aircraft brakes and that he had never seen a brake assembly as described and shown in the '017 and '895 patents. Submission of careless statements under oath deserves criticism, but, as noted above, we are not able to conclude that the district court erred in failing to find intent to deceive from these actions.

CONCLUSION

Because the district court did not err in holding the '017 and '895 patents invalid on the ground of obviousness, we affirm the district court's judgment of invalidity. Because the district court did not err in holding that BFG did not engage in inequitable conduct due to insufficient evidence of an intent to deceive the PTO in prosecuting the '017 and '895 patents, we affirm the district court's judgment regarding inequitable conduct, and we deny ABS's and Allied-Signal's request for attorney fees. In light of our

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holding that the '017 and '895 patents are invalid on the ground of obviousness, the issues relating to the on-sale bar and infringement are moot. *AFFIRMED*.

- End of Case -

